THE UNIVERSITY OF HULL

Rumination and psychological treatments for depression

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by

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Dedication

This thesis is dedicated to the memory of Norma Maureen Brooks, who has been and will remain an inspiration to me throughout my career.

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I would like to thank Dr Christopher Clarke for his research supervision and in particular his ability to make thinking together such a fulfilling and worthwhile experience. I would also like to thank Dr Eric Gardiner for his statistics supervision.

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I would like to thank Emily for her love and support in getting me onto the doctorate and getting me through the doctorate and for her enduring thoughtfulness. I would like to thank my loving and supportive family for always believing in me and I would also like to thank the Needhams for reminding me about all work and no play.

Finally, I would like to thank the great friends that I have made during the course of this research.

Overview

The portfolio has three parts. Parts one and two are conceptually linked by their focus on rumination in the mechanisms of action of psychological treatments for depression.

Part one is a systematic literature review. One proposed mechanism of action for mindfulness-based interventions is that they enable individuals to disengage from automatic and maladaptive ruminative responses to relatively small dips in mood, reducing the likelihood of depressive relapse and reducing depressive symptoms. The systematic literature review examines the clinical evidence for whether mindfulness-based interventions reduce rumination in depression.

Part two is an empirical paper. Two proposed mechanisms of action for rumination-focused cognitive behaviour therapy are that it reduces depressive rumination and that it increases concreteness of thinking. However, these mechanisms need not be mutually exclusive. The empirical paper reports on an experiment that explored the relationship between depressive rumination and concreteness of thinking. It was hoped that the results would contribute to the ongoing discussion regarding the mechanisms of action of rumination-focused cognitive behaviour therapy.

Part three comprises the appendices.

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PART ONE

Do mindfulness-based interventions reduce rumination in depression? A systematic literature review

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Abstract

Evidence suggests that mindfulness-based interventions are effective in the prevention of depressive relapse and the reduction of depressive symptoms. One proposed mechanism by which mindfulness exerts these positive effects is that it enables individuals to disengage from automatic and maladaptive ruminative responses to relatively small dips in mood. The purpose of this systematic literature review was to examine the clinical evidence for whether mindfulness-based interventions specifically reduce rumination in depression. The within-subjects effects reported by the majority of the reviewed articles provide preliminary evidence for an effect of this kind. However, the inconclusive findings relating to between-subjects effects mean that it is not possible at this stage to determine whether mindfulness-based interventions significantly reduce rumination in depression. Methodological recommendations regarding future research are provided.

Keywords: Mindfulness; Rumination; Depression; Systematic literature review

Introduction

Kabat-Zinn (1994) defined mindfulness as "paying attention in a particular way: on purpose, in the present moment, and nonjudgementally" (p. 4). Kabat-Zinn was the first person to base a psychological therapy on the Buddhist concept of mindfulness, in the form of Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990). Since then, Mindfulness-Based Cognitive Therapy for Depression (MBCT; Segal, Williams & Teasdale, 2002) has been developed. Both MBSR and MBCT are known as mindfulness-based interventions (MBIs). Other psychological therapies incorporate mindfulness meditation, including: Dialectical Behaviour Therapy (DBT; Linehan, 1993); Acceptance and Commitment Therapy (ACT; Hayes & Wilson, 1994); and Exposure-Based Cognitive Therapy for Depression (EBCT; Hayes, Beevers, Feldman, Laurenceau & Perlman, 2005). However, as these draw on other conceptual bases and incorporate other interventions, they are not known as MBIs.

In the theoretical development of MBCT, Segal et al. (2002) drew upon the differential activation hypothesis (Teasdale, 1988), which proposes that recurrently depressed individuals may react to relatively small dips in mood by engaging in maladaptive repetitive thinking styles, which exacerbate and maintain their depressive symptoms. Depressive rumination is a particular type of maladaptive repetitive thinking known to predict the onset, intensity and duration of major depressive episodes (see Treynor, Gonzalez & Nolen-Hoeksema, 2003). For the sake of clarity, depressive rumination is referred to as 'rumination' throughout. According to the response styles theory of depression (Nolen-Hoeksema, 1991), rumination involves "repetitively focusing on the fact that one is depressed; on one's symptoms of depression; and on the causes, meanings and consequences of depressive symptoms" (p. 569).

Taking the differential activation hypothesis and subsequent research into rumination into account, it is hypothesised that MBCT enables recurrently depressed individuals to disengage from automatic and maladaptive ruminative responses to relatively small dips in mood, which prevents depressive relapse (Segal et al., 2002; Williams, Russell & Russell, 2008). In therapy, patients cultivate a mindful awareness of internal and external states and stimuli, through the use of formal and informal mindfulness exercises. In doing so, patients learn to notice relatively small dips in mood, to observe the accompanying onset of rumination and to switch to a mindful exploration of the present moment. Mindful exploration involves relating to thoughts and feelings as passing events in the mind rather than as accurate representations of reality. This shift in metacognitive stance is known as decentering (Segal et al., 2002).

With regard to efficacy, Godfrin and van Heeringen (2010) found that MBCT in addition to treatment as usual (TAU) significantly reduced the likelihood of depressive relapse and significantly increased time until next depressive episode, in patients with a history of three or more depressive episodes, when compared to TAU alone. They also reported significant decreases in short and long-term depressed mood in the MBCT with TAU condition, when compared to TAU alone. Equally, a meta-analysis by Klainin-Yobas, Cho and Creedy (2012) found that MBIs in general are consistently more effective than TAU in the prevention of depressive relapse and in the reduction of depressive symptoms.

In brief, MBIs appear to be effective in the prevention of depressive relapse and the reduction of depressive symptoms and one proposed mechanism by which mindfulness exerts these positive effects is that it enables individuals to disengage from automatic and maladaptive ruminative responses to relatively small dips in mood (Segal et al.,

2002; Williams et al. 2008). However, Shapiro, Carlson, Astin and Freedman (2006) proposed a variety of alternative theoretical mechanisms for MBIs, concluding that research into the mechanisms of mindfulness was still in its infancy at the time of writing.

In this context, the aim of the present systematic literature review was to answer the following question:

Do MBIs reduce rumination in depression?

The rationale for this question was that, despite significant empirical evidence for the efficacy of MBIs, no systematic literature review has explored one or more of the mechanisms of mindfulness suggested in the literature. The review aimed to evaluate the clinical evidence for the mechanism proposed by Segal et al. (2002), in their development of MBCT. If MBIs were found to reduce rumination in depression, their clinical use would be especially indicated with recurrently depressed patients high in rumination, as it is hypothesised that rumination contributes considerably to depressive relapse (Teasdale, 1988).

Method

In order to answer the review question, intervention studies were sought in which rumination was measured pre and post-delivery of a MBI.

Literature search protocol

The following three online databases were chosen and accessed (May 2013) via the EBSCOhost service:

- CINAHL Plus provides full text for over 770 nursing and allied health journals;
- MEDLINE provides access to over 5400 medicine, nursing, dentistry, veterinary medicine, health care and pre-clinical sciences journals;
- PsycINFO provides access to over 3000000 behavioural science and mental health citations.

The following search terms were chosen:

- Mindful*
- AND Ruminat* OR Brood* OR Reflect*
- AND Depress*

The terms Brood* and Reflect* were included on the basis of Nolen-Hoeksema and Morrow's (1991) two factor model of rumination. Based on a principal components analysis of their Ruminative Responses Scale (RRS) the authors reported that brooding involves "a passive comparison of one's current situation with some unachieved standard" (p. 256), while reflection involves "a purposeful turning inward to engage in cognitive problem-solving to alleviate one's depressive symptoms" (p. 256). Both terms were included to capture any studies that had looked at either of these factors in isolation.

Inclusion and exclusion criteria

For inclusion in the review, articles had to come from a peer-reviewed source but no geographical, temporal or linguistic limitations were included in the search protocol. All duplicates were removed prior to application of the exclusion criteria.

All abstracts were read and articles were excluded from the review based on one or more of the following criteria:

- No MBI e.g. not an intervention study;
- No measurement of rumination pre and post-intervention;
- Not all participants met diagnostic criteria for historical or current depression.

Studies investigating both historical and current depression were included in the review, as MBIs have been used to treat recurrent and current major depressive disorder. As rumination is predictive of both the onset and maintenance of depression (see Treynor et al., 2003), the potential for mindfulness to exert its positive effects via its effect on rumination is of interest in the treatment of recurrent and current major depressive disorder.

All articles failing to meet one or more of the exclusion criteria, on the basis of abstracts, were retrieved in full. Retrieved articles were then read in full and the exclusion criteria were re-applied. In addition, the reference lists of retrieved articles were checked by hand and those referenced articles failing to meet one or more of the exclusion criteria were also included in the final pool of articles. Figure 1. summarises how the literature search protocol led to the final pool of included articles (n = 10).

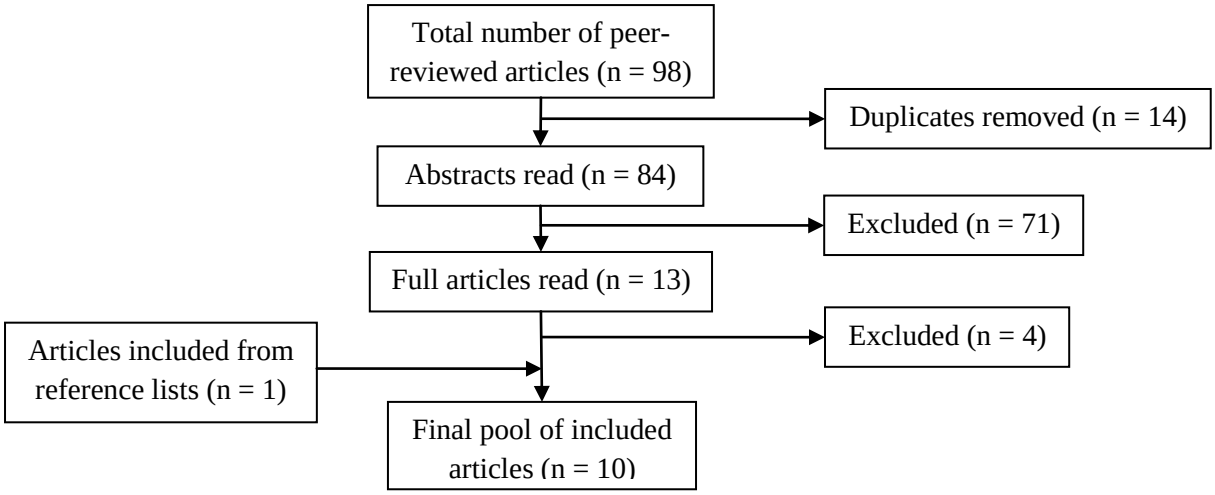

Figure 1. Summary of article selection

Data extraction

The following data were extracted from each reviewed article:

- Aim(s) of study;
- Characteristics of participants i.e. nature of depression and how this was assessed;
- Nature of MBI;
- Within-subjects effects of MBI on rumination and how this was measured;
- Between-subjects effects of MBI on rumination and how this was measured.

Within and between-subjects effects were differentiated on the basis that several reviewed studies were uncontrolled and thus were only able to report within-subjects effects.

Methodological quality assessment

A modified version of the Downs and Black (1998; see Appendix A.) checklist was used to assess the methodological quality of each reviewed study. Downs and Black (1998) reported that the checklist demonstrated good reliability when used to assess the

methodological quality of both randomised and non-randomised trials of healthcare interventions. However, modifications to the checklist may have affected its reliability in this review.

The checklist was modified in four ways. Firstly, the wording of 12 items was modified to better reflect the focus of the review question. For example, the question "Are the main findings of the study clearly described?" was modified to "Are the main findings relating to rumination clearly described?". For the purpose of the review, it did not matter whether authors had clearly described all of their findings. Instead, it mattered whether authors had clearly described their findings relating to rumination.

Secondly, five items' scores were modified, to better reflect the bearing of those items on the quality of each reviewed article, in relation to the focus of the review question. Key determinants of methodological quality in relation to the review question were deemed to be: whether a MBI had been delivered in accordance with a reliable treatment protocol; whether rumination had been measured reliably; and whether depression had been assessed reliably. As such, the scoring of items relating to these factors was doubled from yes = 1 and no = 0 to yes = 2 and no = 0, so that they contributed more heavily to the overall rating of each article's quality.

Thirdly, the question "Was the study controlled?" was added and given double scoring. The presence of a control condition was deemed particularly important in determining whether conclusions relating to the review question could be drawn from the findings of the reviewed studies.

Finally, eight items were removed, as they did not contribute to an assessment of quality in relation to the focus of the review question. For example, the question, "Have the characteristics of patients lost to follow-up been described?", while important when reviewing the clinical viability of an intervention, was not important in answering whether or not MBIs reduce rumination and so this item was removed.

Data analysis

Despite the quantitative nature of the 10 reviewed articles, a meta-analysis could not be used to summarise the review's findings, due to heterogeneity between studies. Sources of heterogeneity included: the use of different MBIs; the use of different statistical analyses to compute the main findings relating to rumination; the inconsistent reporting of effect sizes; and the inclusion of participants at different stages in their depression i.e. historical vs. current. As such, a narrative synthesis was used to summarise the review's findings.

Results

Table 1. summarises the data extracted from each of the 10 reviewed articles. Of the 10 studies, one investigated MBSR and nine investigated MBCT. The mean number of participants recruited to each study was 68 (SD = 57.45). Three studies were conducted in the USA, two in the Netherlands, two in Germany, one in Ireland, one in Canada and one in Australia. Table 2. summarises each of the 10 reviewed articles' scores on the modified Downs and Black (1998) checklist for methodological quality. Both tables were drawn on in the narrative synthesis of the review's findings that follows.

Table 1. Summary of reviewed studies

Study	Aim(s) of study	Characteristics of participants	Nature of MBI	Within-subjects effects of MBI on rumination	Between-subjects effects of MBI on rumination
Ramel et al. (2004; USA)	To examine the effects of mindfulness meditation on affect and negative cognitive patterns in a clinical population	Met lifetime DSM-IV criteria for a mood disorder, as identified by the SCID n = 23 in MBSR group n = 11 in waitlist control group	8-week course of MBSR: Weekly 2-hour sessions One half-day meditation 30-45 minutes of daily homework	Significant reduction in RSQ-Rumination i.e. RRS scores in the MBSR group ($t_{(22)} = 3.82$, $p < 0.001$; Cohen's d = 0.80)	Significant interaction between group and time of testing for RRS scores ($F_{(20)} = 10.78$, $p < 0.004$; Cohen's d = 1.47)
Kingston et al. (2007; Ireland)	To examine the efficacy of MBCT in reducing residual depressive symptoms and to examine the effects of mindfulness techniques on rumination	Met DSM-IV criteria for recurrent major depressive disorder (three or more previous episodes), as identified by a consultant psychiatrist, with residual depressive symptoms, as identified by a BDI score between 13 and 45 n = 8 in MBCT group n = 11 in TAU control group	8-week course of MBCT: Weekly 2-hour sessions Homework exercises between sessions	Significant reduction in RRS scores in the MBCT group ($F_{(1, 13)} = 21.83$, $p < 0.05$)	No significant interaction between group and time of testing for RRS scores ($F_{(1, 13)} = 4.13$, $p = 0.063$; Cohen's d = 1.16)

Eisendrath et al. (2008; USA)	To examine the efficacy of MBCT augmentation of psychotherapy and medication treatment for treatment-resistant depression	Had DSM-IV diagnoses of major depressive disorder, which had failed to remit with two or more antidepressant medications, as identified by a BDI score of 10 or higher n = 55 in MBCT group	8-week course of MBCT adapted for use with actively depressed patients: Weekly 2-hour sessions	Significant reduction in RRS scores ($p = 0.013$)	N/A
Shahar et al. (2010; USA)	To examine the immediate effects of MBCT on its hypothesised mechanisms of change	Met DSM-IV criteria for major depressive disorder within the last 60 months, with three or more previous episodes, as identified by the SCID, and a subjective rating of partial remission within the last six weeks, as identified by a HDRS score of 20 or lower n = 26 in MBCT group n = 19 in waitlist control group	8-week course of MBCT: Weekly 3-hour sessions One all-day silent retreat Homework exercises between sessions	Multiple regression analysis revealed a significant effect of MBCT on a reduction in RRS-Brooding scores ($\beta = -0.58$, $p = 0.0021$) but <u>not</u> on changes in RRS-Reflection scores ($\beta = 0.01$, $p = 0.9221$)	

Geschwind et al. (2011; Netherlands)	To examine the effects of MBCT on momentary positive affect and the use of natural rewards in day-to-day life	Met DSM-IV criteria for one or more previous episode of major depressive disorder, as identified by the SCID, with residual symptoms, as identified by a HDRS score of seven or higher n = 63 in MBCT group n = 66 in waitlist control group	8-week course of MBCT: Weekly 2½-hour sessions 30-60 minutes of daily homework	Significant reduction in RSS scores in the MBCT group ($p < 0.05$)	Not reported
Keune et al. (2011; Germany)	To examine the effects of MBCT on rumination, mindfulness and depressive symptomatology in recurrently depressed patients and to examine whether these changes are manifest on a neurophysiological level	Met DSM-IV criteria for three or more previous episodes of major depressive disorder but could not have met criteria within the last four weeks, as identified by the German version of the SCID n = 40 in MBCT group n = 35 in waitlist control group	8-week course of MBCT	Significant main effects of time on RSQ-D-Symptom-focused rumination scores ($F_{(1, 75)} = 18.75$, $p < 0.001$) and RSQ-D-Self-focused rumination scores ($F(1, 75) = 11.71$, $p = 0.001$)	No significant interactions between group and time of testing for RSQ-D-Symptom-focused rumination scores ($F_{(1, 75)} = 3.42$, $p = 0.07$) and RSQ-D-Self-focused rumination scores ($F(1, 75) = 3.47$, $p = 0.07$)

Michalak et al. (2011; Germany)	To examine whether MBCT reduces the propensity to ruminate in formerly depressed patients and to examine whether rumination predicts relapse post-MBCT	Met DSM-IV criteria for two or more previous episodes of major depressive disorder, as identified by the German version of the SCID, with a subjective rating of partial remission, as identified by a HDRS score of less than 10 n = 24 in MBCT group	8-week course of MBCT: Weekly 2½- hour sessions One intensive all-day retreat	Significant reduction in RRS scores ($t_{(23)} = 2.62$, $p < 0.05$; Cohen's $d = 0.44$)	N/A
Bieling et al. (2012; Canada)	To examine whether the metacognitive changes acquired during MBCT are also acquired during antidepressant treatment for the prevention of depressive relapse	Had DSM-IV diagnoses of major depressive disorder, with two or more previous episodes and a HDRS score of 16 or higher n = 15 in MBCT group n = 17 in antidepressant group n = 15 in placebo group	Acute antidepressant treatment for six to eight months followed by 8-week course of MBCT: Weekly 2-hour sessions One 6-hour retreat day	No significant reduction in EQ-Rumination scores in the MBCT group ($p > 0.05$)	Not reported

Manicavasagar et al. (2012; Australia)	To examine the relationships between depression, rumination and mindfulness scores post-MBCT and CBT	Met DSM-IV criteria for major depressive disorder and had experienced depressive symptoms for the last three months or more, as identified by the CIDI, and had a BDI score of 20 or higher n = 19 in MBCT group n = 26 in CBT group	8-week course of MBCT: Weekly 2-2½-hour sessions	Significant main effect of time on RRS scores ($F_{(2, 40)} = 4.68$, $p = 0.02$)	Following no significant difference between groups on pre-intervention RRS scores, there was still no significant difference between groups on post-intervention RRS scores
van Aalderen et al. (2012; Netherlands)	To examine the efficacy of MBCT in a representative sample of recurrently repressed patients, with or without a current depressive episode, and to investigate rumination, worry and mindfulness as mediators of change	Met DSM-IV criteria for three or more previous episodes of major depressive disorder, as identified by the MINI, incorporating the SCID n = 102 in MBCT + TAU group n = 103 in TAU group	8-week course of MBCT: Weekly 2½-hour sessions One 6-hour day of silent meditation 45 minutes of homework on six days of the week	Not reported	Following no significant difference between groups on pre-intervention RSS scores, post-intervention RSS scores were significantly lower in the MBCT + TAU group than in the TAU group ($F_{(1, 44.3)} = 13.4$, $p < 0.01$; Cohen's $d = 0.50$)

MBI, mindfulness-based intervention; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (American Psychiatric Association, 1994); SCID, Structured Clinical Interview for DSM-IV-TR Axis I Disorders; MBSR, Mindfulness-Based Stress Reduction; RSQ, Response Style Questionnaire; RRS, Ruminative Responses Scale; MBCT, Mindfulness-Based Cognitive Therapy for Depression; BDI, Beck Depression Inventory; TAU, treatment as usual; HDRS, Hamilton Depression Rating Scale

(Hamilton, 1960); RSS, Rumination on Sadness Scale; RSQ-D, Response Style Questionnaire-German Version; EQ, Experiences Questionnaire; CBT, Cognitive Behaviour Therapy; CIDI, Composite International Diagnostic Interview (Robins et al., 1988).; MINI, Mini-International Neuropsychiatric Interview (Sheehan et al., 1998).

Table 2. Summary of methodological quality assessment

Study	Checklist Item																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Ramel et al. (2004)	1	1	1	1	2	1	1	0	2	0	0	1	0	1	0	2	2	0	1	0	17/26
Kingston et al. (2007)	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	2	2	0	0	0	13/26
Eisendrath et al. (2008)	0	1	1	0	0	0	1	1	0	0	0	1	1	1	0	2	0	0	0	0	9/26
Shahar et al. (2010)	1	1	1	1	2	1	1	1	2	0	1	1	1	1	0	2	2	1	0	1	21/26
Geschwind et al. (2011)	1	1	1	1	2	1	1	0	2	0	0	1	1	1	2	2	2	1	0	1	21/26
Keune et al. (2011)	1	1	1	0	2	1	0	1	2	0	0	1	1	1	0	2	2	1	0	0	17/26
Michalak et al. (2011)	1	1	1	0	1	1	1	0	2	0	0	1	1	1	0	2	0	0	0	0	13/26
Bieling et al. (2012)	1	1	1	0	2	1	1	0	0	0	0	1	1	1	0	2	2	1	0	0	15/26
Manicavasagar et al. (2012)	1	1	1	0	1	1	1	1	2	0	0	1	1	1	0	2	2	1	0	0	17/26
van Aalderen et al. (2012)	1	1	1	1	2	1	1	0	2	0	0	1	1	1	2	2	2	1	0	0	20/26
Total	9/10	10/10	10/10	5/10	15/20	9/10	9/10	4/10	14/20	0/20	1/10	10/10	9/10	9/10	4/20	20/20	16/20	6/10	1/10	2/10	163/260

The following narrative synthesis describes the reported effects of MBSR on rumination in a matched participants study and of MBCT on rumination in uncontrolled, non-randomised and randomised controlled studies. The narrative makes reference to the findings of the methodological quality assessment throughout.

The effect of MBSR on rumination

Ramel, Goldin, Carmona and McQuaid (2004) provided an 8-week course of MBSR to 23 participants meeting lifetime criteria for a mood disorder. The authors reported a significant reduction in pre to post-intervention scores on the Response Style Questionnaire (RSQ; see Nolen-Hoeksema & Morrow, 1991) Rumination Subscale i.e. the RRS. The study benefited from a waitlist control condition of 11 matched participants, allowing for the investigation of between-subjects effects. However, randomisation of participants to conditions would have further reduced the likelihood of sampling bias. The authors reported a significant interaction between group and time of testing for RRS scores, illustrating a significantly greater reduction in rumination in the MBSR condition than in the waitlist control condition.

The Ramel et al. (2004) study benefited from a reliable assessment of depression, the Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID; First, Spitzer, Gibbon & Williams, 2002), and from the use of a reliable rumination measure, the RRS. However, the MBSR course provided differed from the protocol currently recommended by the University of Massachusetts Medical School's Centre for Mindfulness website ("Stress Reduction Programme", 2013), which involves: eight weekly 2½-hour classes; one all-day meditation retreat; and homework on six out of seven days of the week. Equally, the mean number of hours of mindfulness practiced

during the 8-week course was 11.46 (SD = 15.35), indicating that most participants were practicing on considerably less than six out of seven days of the week.

The effect of MBCT on rumination

Uncontrolled studies

Two studies reported the effects of mindfulness on rumination as part of uncontrolled evaluations of the efficacy of MBCT for current or historical depression. Eisendrath et al. (2008) provided an 8-week course of MBCT to 55 participants with diagnoses of major depressive disorder, which had failed to remit in response to two or more antidepressant medications. The authors reported a significant reduction in pre to post-intervention scores on the RRS. Michalak, Hölz and Teismann (2011) provided an 8-week course of MBCT to 24 participants meeting criteria for two or more previous episodes of major depressive disorder, with subjective ratings of partial remission. The authors reported a significant reduction in pre to post-intervention scores on the RRS.

The Eisendrath et al. (2008) and Michalak et al. (2011) studies received two of the lowest overall ratings of methodological quality of the 10 reviewed studies. Although both studies benefitted from the use of a reliable rumination measure, the RRS, neither included a control condition which limited their internal and external validity. While the Michalak et al. (2011) study benefited from a reliable assessment of depression, the German version of the SCID (Wittchen, Wunderlich, Gruschwitz & Zaudig, 1997), Eisendrath et al. (2008) failed to describe a reliable assessment method. The MBCT courses provided in both studies differed from the protocol currently recommended by the MBCT website (“Classes”, 2013), which involves: eight weekly 2-hour classes; one all-day meditation retreat; and daily homework. Neither group of authors provided data for treatment compliance i.e. mindfulness practiced.

Non-randomised controlled study

Kingston, Dooley, Bates, Lawlor and Malone (2007) provided an 8-week course of MBCT to eight participants meeting criteria for three or more previous episodes of major depressive disorder, with residual depressive symptoms. The authors reported a significant reduction in pre to post-intervention scores on the RRS. The study benefited from a TAU control condition of 11 participants. However, participants were not randomised to conditions, which would have reduced the likelihood of sampling bias. The authors reported no significant interaction between group and time of testing for RRS scores, illustrating statistically equivalent reductions in rumination across the MBCT and TAU conditions. The authors did report a significantly greater reduction in scores on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock & Erbaugh, 1961) in the MBCT condition than in the TAU condition.

The Kingston et al. (2007) study benefited from the use of a reliable rumination measure, the RRS. However, the authors described no reliable assessment of depression, relying instead on the clinical opinion of one consultant psychiatrist. Also, the MBCT course provided differed from the protocol currently recommended by the MBCT website and no data were provided for treatment compliance i.e. mindfulness practiced. Finally, the small sample size recruited in the study calls into question the appropriateness of the parametric analysis of variance employed. Despite the presence of a control condition, the Kingston et al. (2007) study received an overall rating of methodological quality equivalent to the uncontrolled Michalak et al. (2011) study.

Randomised controlled studies

Shahar et al. (2010) provided an 8-week course of MBCT to 26 participants meeting criteria for major depressive disorder within the last 60 months, with three or more

previous episodes and a subjective rating of partial remission within the last six weeks. The study benefited from a waitlist control condition of 19 participants. Multiple regression analysis revealed a significant effect of MBCT on reduction in RRS-Brooding Subscale scores but not on changes in RRS-Reflection Subscale scores.

Geschwind, Peeters, Drukker, van Os and Wichers (2011) provided an 8-week course of MBCT to 63 participants meeting criteria for one or more previous episode of major depressive disorder, with residual depressive symptoms. The authors reported a significant reduction in pre to post-intervention scores on the Dutch version of the Rumination on Sadness Scale (RSS; Raes, Hermans, & Eelen, 2003). The study benefited from a waitlist control condition of 66 participants. However, the authors did not report on between-subjects effects on rumination or depression.

Keune, Bostanov, Hautzinger and Kotchoubey (2011) provided an 8-week course of MBCT to 40 participants meeting criteria for three or more previous episodes of major depressive disorder, who had not met criteria within the last four weeks. The authors reported significant reductions in pre to post-intervention scores on the German version of the RSQ (RSQ-D; Kühner, Huffziger & Nolen-Hoeksema, 2007). The study benefited from a waitlist control condition of 35 participants. The authors reported no significant interactions between group and time of testing for both RSQ-D Subscale scores, indicating statistically equivalent reductions in rumination across the MBCT and waitlist control conditions. The authors did report a significantly greater reduction in BDI scores in the MBCT condition than in the waitlist control condition.

Bieling et al. (2012) provided an 8-week course of MBCT to 15 participants meeting criteria for major depressive disorder, with two or more previous episodes. The authors

reported no significant reduction in pre to post-intervention scores on the Experiences Questionnaire (EQ; Fresco et al., 2007) Rumination Subscale. The study benefited from an antidepressant condition of 17 participants and a placebo control condition of 15 participants. However, the authors did not report on between-subjects effects on rumination or depression.

Manicavasagar, Perich and Parker (2012) provided an 8-week course of MBCT to 19 participants meeting criteria for major depressive disorder, who had experienced depressive symptoms for the last three months or more. The authors reported a significant reduction in pre to post-intervention scores on the RRS. The study benefited from a CBT condition of 26 participants. The authors reported that, following no significant difference between groups' pre-intervention scores on the RRS, there was no significant difference between groups' post-intervention scores on the RRS. This illustrated statistically equivalent reductions in rumination across the MBCT and CBT conditions. The authors also reported statistically equivalent reductions in BDI scores across the MBCT and CBT conditions.

Finally, van Aalderen et al. (2012) provided an 8-week course of MBCT and TAU to 102 participants meeting criteria for three or more previous episodes of major depressive disorder with or without a current depressive episode. The study benefited from a TAU control condition of 103 participants. The authors reported that, following no significant difference between groups' pre-intervention scores on the RSS, there was a significant difference between groups' post-intervention scores on the RSS. This illustrated a significantly greater reduction in rumination in the MBSR and TAU condition than in the TAU control condition.

All six of the randomised controlled studies reviewed benefited from the use of a reliable rumination measure e.g. the RRS. Equally, five of the studies benefited from a reliable assessment of depression e.g. the SCID. Only Bieling et al. (2012) failed to describe a reliable assessment method. However, the MBCT courses provided in all six studies differed from the protocol currently recommended by the MBCT website. Data for treatment compliance were provided by Geschwind et al. (2011), who reported a mean of 29.7 minutes of mindfulness practice per day (SD = 13.2), and by van Aalderen et al. (2012), who reported a mean of 30 days on which participants practiced mindfulness during the 8-week course (SD = 10.2). Data for treatment compliance were either not collected or not reported in the remaining studies.

Additional findings relating to methodological quality

The methodological quality assessment also revealed that, of the 10 reviewed studies, only Shahar et al. (2010) made an attempt to blind those measuring the main findings in relation to rumination. Blind measurement was either not attempted or not reported in the remaining studies. Equally, it was felt that only Ramel et al. (2004) made adequate adjustment for confounding variables in the analyses from which the main findings relating to rumination were drawn. The majority of the remaining studies based their main findings relating to rumination on analyses of treated participants' data rather than intention to treat data. Finally, it was only possible to confirm that the Shahar et al. (2010) and Geschwind et al. (2011) studies had sufficient power to detect a clinically important effect. The majority of the remaining studies failed to report power or sample size calculations.

Taking into account total scores on the methodological quality assessment, the strongest three studies reviewed were: Shahar et al. (2010); Geschwind et al. (2011); and van

Aalderen et al. (2012). Shahar et al. (2010) and van Aalderen et al. (2012) reported statistically greater reductions in rumination in their MBI conditions than in their control conditions. Geschwind et al. (2011) did not report on between-subjects effects. The mean total score on the methodological quality assessment was 16.30 (SD = 3.89).

Discussion

Do MBIs reduce rumination in depression?

Within-subjects effects

Of the 10 reviewed articles, seven reported significant reductions in rumination in participants receiving a MBI. Only Bieling et al. (2012) reported no significant reduction in rumination but this study achieved a below average total score for methodological quality of 15. Shahar et al. (2010) and van Aalderen et al. (2012) did not report on within-subjects effects.

Between-subjects effects

Of the 10 reviewed articles, three reported significant between-subjects effects of MBIs on rumination. Ramel et al. (2004), Shahar et al. (2010) and van Aalderen et al. (2012) reported statistically greater reductions in rumination in their MBI conditions than in their control conditions. Two of these studies were in the strongest three studies reviewed and they achieved a mean total score for methodological quality of 19.33.

Three articles reported no significant between-subjects effects of MBIs on rumination. Kingston et al. (2007), Keune et al. (2011) and Manicavasagar et al. (2012) reported statistically equivalent reductions in rumination across their MBI and control conditions. However, these studies achieved a lower mean total score for

methodological quality of 15.67, calling into question the reliability and validity of their results in relation to the methodologically stronger studies discussed above.

Geschwind et al. (2011) and Bieling et al. (2012), while including control conditions, did not report on between-subjects effects on rumination. The Eisendrath et al. (2008) and Michalak et al. (2011) studies were uncontrolled and so were unable to examine between-subjects effects on rumination.

Overview of methodological quality in the area

Depression was reliably assessed in seven of the 10 reviewed studies. As such, findings drawn from the literature in the area can be generalised to the real-world depressed population with some confidence. However, it may be possible that patients receiving MBIs for depression in the real-world are less likely to have been reliably assessed, which calls into question the external validity of the literature as a whole. Rumination was reliably measured in all 10 of the reviewed studies. However, only one article reported making an attempt to blind those measuring the main findings in relation to rumination. This allows for the possibility of measurement bias in the literature as a whole.

A reliable treatment protocol was followed in the delivery of MBIs in none of the reviewed studies. Divergences from treatment protocols included: the lengthening or shortening of weekly classes; the lengthening, shortening or omission of all-day meditation retreats; and the omission of homework requirements. As such, it is difficult to generalise findings drawn from the literature in the area to the real-world delivery of MBIs. However, it may be possible that the real-world delivery of MBIs is often divergent from reliable treatment protocols, which may somewhat improve the external

validity of the literature as a whole. Adequate compliance with MBIs could only be confirmed in two of the 10 reviewed studies. Another study reported poor compliance with the intervention i.e. less mindfulness practice than required. Data for treatment compliance were either not collected or not reported in the remaining articles. This calls into question the internal validity of the literature as a whole.

Eight of the 10 reviewed studies benefited from a control condition and six of these benefited from randomisation of participants to conditions, reducing the likelihood of sampling bias. It was felt that only one of the 10 reviewed studies made adequate adjustment for confounding variables in the analyses from which the main findings relating to rumination were drawn. The majority of the remaining studies based their main findings relating to rumination on analyses of treated participants' data rather than intention to treat data, which calls into question the internal validity of the literature as a whole.

Finally, it was only possible to confirm that two of the 10 reviewed studies had sufficient power to detect a clinically important effect. The majority of the remaining studies failed to report power or sample size calculations. As such, the likelihood of Type II errors i.e. false acceptance of null hypotheses, is generally high in the literature as a whole.

Recommendations regarding future intervention studies

Based on the findings of the review and its methodological quality assessment, it is recommended that future intervention studies investigate the between-subjects effects of MBIs on rumination, as they currently remain unclear. Methodological quality in the area would be improved by consideration of the following:

- Strict adherence to reliable treatment protocols in the provision of MBIs;
- The measurement and reporting of treatment compliance i.e. mindfulness practiced;
- Blinding those measuring the main findings relating to rumination;
- The analysis of intention to treat data, rather than the selective consideration of treated participants' data;
- The recruitment of participants based on sample size calculations, which are reported in the write-up and estimate sufficient power to detect a clinically important effect.

Weaknesses of the review

Only peer-reviewed articles were included in the review and no attempt was made to access grey literature or unpublished articles. This decision was made to maximise the quality of reviewed articles but it may mean that the review's findings are subject to publication bias (Rothstein, Sutton & Borenstein, 2005). The review was weakened by the fact that only one rater assessed articles' suitability for inclusion. As such, it is impossible to determine the reliability of the article selection process. Given the clear focus of the review, it was not necessary to extract large amounts of data from the reviewed articles, in order to answer the review question. However, as a result, the review may be criticised for a limited scope of data extraction. Finally, only one rater used the modified Downs and Black (1998) checklist to assess the methodological quality of each reviewed study. As such, it is impossible to determine the reliability of the methodological quality assessment.

Conclusions and implications

Taking into account the within-subjects effects reported by the majority of the reviewed articles, it appears that rumination reduces significantly during MBIs. However, given the mixed findings of the six articles reporting on between-subjects effects, it is unclear whether MBIs themselves significantly influence this reduction in rumination. As three studies found statistically equivalent reductions in rumination when comparing MBIs with waitlist control, TAU and CBT conditions respectively, is impossible to rule out a third factor, common to all four conditions, which may account for the reductions in rumination reported. For example, rumination may be affected by changes in social and occupational context.

This review aimed to examine one strand of the evidence for the mechanism of mindfulness proposed by Segal et al. (2002), in their development of MBCT i.e. that mindfulness enables individuals to disengage from automatic and maladaptive ruminative responses to relatively small dips in mood. As evidence for the effect of MBIs on rumination is inconclusive, it is not currently possible to support Segal et al.'s (2002) hypothesis above and beyond any other theoretical mechanism of mindfulness proposed by Shapiro et al. (2006). Where a reduction in rumination is seen as a clinical priority, it may be helpful to adopt approaches more specifically aimed at affecting rumination e.g. rumination-focused cognitive behaviour therapy for residual depression (RFCBT; see Watkins et al., 2007). Experimental and clinical research into the mechanisms by which RFCBT achieves its effects is ongoing (see Brooks and Clarke, 2013) and should be emulated in the MBI literature.

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*Reviewed articles

PART TWO

The effect of depressive rumination on concreteness of thinking in-the-moment

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Abstract

Evidence suggests that training individuals to think more concretely during emotionally distressing experiences, by focusing on specific, contextual details, reduces the occurrence of depressive rumination. However, it is not clear whether this relationship is bidirectional, such that inducing depressive rumination reduces concreteness of thinking in-the-moment. The purpose of this study was to investigate the potential bidirectionality of this relationship by exploring the effects of two types of depressive rumination, reflection and brooding, on concreteness of thinking in the description of visual scenes and subjective awareness. A between-subjects experiment was designed in which non-clinical participants' concreteness of thinking was measured prior to and following the induction of reflection or brooding. A "do nothing" control condition was also included. No significant differences were found between the conditions' effects on concreteness of thinking. This calls into question the proposed bidirectionality of the relationship between depressive rumination and concreteness of thinking in-the-moment. Whilst thinking concretely during emotionally distressing experiences appears to reduce depressive rumination, depressive rumination itself may not directly influence concreteness of thinking in-the-moment. Key methodological issues are discussed in relation to the findings and recommendations are made regarding future research.

Keywords: Rumination; Concreteness; Depression; Cognitive behaviour therapy

Introduction

Watkins (2008) reviewed the literature on a number of conceptually similar thought processes, known collectively as repetitive thought, which are associated with the onset and maintenance of various psychological disorders. The word rumination has been used to describe several of these processes, including: depressive rumination (Nolen-Hoeksema, 1991); post-event rumination (Kashdan & Roberts, 2007); and positive rumination (Johnson, McKenzie & McMurrich, 2008). The present study focused specifically on depressive rumination, which for the sake of clarity, is referred to as 'rumination' throughout.

According to the response styles theory of depression (Nolen-Hoeksema, 1991), rumination involves "repetitively focusing on the fact that one is depressed; on one's symptoms of depression; and on the causes, meanings and consequences of depressive symptoms" (p. 569). Evidence suggests that there are stable individual differences in the propensity to engage in rumination when distressed (Nolen-Hoeksema & Davis, 1999). Trait rumination appears to predict the onset, intensity and duration of major depressive episodes (see Treynor, Gonzalez & Nolen-Hoeksema, 2003). In combination with negative affect, rumination also appears to be associated with impaired concentration and problem-solving (Lyubomirsky & Tkach, 2004).

Treynor et al. (2003) factor-analysed the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991), a 22-item self-report measure of ruminative coping, and proposed a two factor model of rumination. The first factor, called reflection, involves "a purposeful turning inward to engage in cognitive problem-solving to alleviate one's depressive symptoms" (p. 256). The authors reported an association between reflection and depressive symptoms concurrently but a contrasting association between reflection

and the alleviation of depressive symptoms at one-year follow-up. The second factor, called brooding, involves "a passive comparison of one's current situation with some unachieved standard" (p. 256). The authors reported an association between brooding and depressive symptoms concurrently and at one-year follow-up.

Watkins et al. (2007) published a case series providing the first data on rumination-focused cognitive behaviour therapy for residual depression (RFCBT). Patients had to have met DSM-IV criteria (American Psychiatric Association, 1994) for major depression within the last 18 months but not within the last two months. They also had to be experiencing residual symptoms of depression as evidenced by a score of eight or more on the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960) and a score of nine or more on the Beck Depression Inventory II (BDI-II; Beck, Steer & Brown, 1996). While drawing heavily on traditional cognitive behaviour therapy (CBT), treatment specifically focused on the functional analysis of rumination, seen as a depressive avoidance strategy. A detailed analysis of the context in which rumination occurred helped patients to recognise when they were beginning to ruminate. They were then taught to engage in more helpful approach behaviours e.g. assertiveness, and to modify the environments in which rumination was likely to occur. Watkins et al. (2007) reported that RFCBT appeared to be effective in the treatment of residual depression.

Watkins et al. (2011) subsequently compared RFCBT plus antidepressant treatment to antidepressant treatment alone, in a pilot randomised controlled trial. Of the participants receiving RFCBT plus antidepressant treatment, 62% met full remission criteria at six-month follow-up. This compared favourably to a remission rate of 25% following CBT plus antidepressant treatment (see Paykel et al., 1999). Only 21% of participants receiving antidepressant treatment alone met full remission criteria at six-month follow-

up. Mediational analysis revealed that change in rumination was a mediator of change in depressive symptoms. Watkins et al. (2011) tentatively concluded that RFCBT plus antidepressant treatment is more effective than antidepressant treatment alone in the treatment of residual depression. Reduction in rumination was proposed as a potential mechanism of action for RFCBT.

Watkins and colleagues have also begun to identify a distinction between two thinking styles, which has informed another potential mechanism of action for RFCBT (see Watkins, 2009). Watkins, Moberly and Moulds (2008) found that non-clinical participants asked to imagine emotional scenarios in a 'concrete' way, by focusing on specific contextual details about how the scenes unfolded, experienced a smaller decrease in self-reported positive affect and a smaller increase in self-reported negative affect following exposure to a failure experience than participants asked to imagine the same scenarios in a more 'abstract' way, by focusing on assumptions and interpretations about why the scenes unfolded. Watkins et al. (2008) suggested that concrete thinking modifies emotional reactivity in a positive way, whilst abstract thinking exacerbates low mood following a negative event. This led to the development of another clinical intervention, called concreteness training.

Watkins and Moberly (2009) investigated the efficacy of concreteness training by allocating dysphoric participants to either an active intervention control condition, involving relaxation training, or to a condition involving relaxation training plus concreteness training. Dysphoria was defined by scores in the clinical range on the BDI-II over a two week assessment period. Concreteness training involved the repetition of mental exercises designed to encourage concrete thinking about emotionally distressing experiences in preference to abstract thinking. As concreteness training was devised as a

guided self-help intervention, participants received a training session in either relaxation or relaxation plus concreteness training and were then asked to listen to an audio recording of the session on seven consecutive days. Participants in the relaxation training plus concreteness training condition experienced significantly greater decreases in rumination and depressive symptomatology than those in the relaxation training alone condition.

Drawing on the above studies, Watkins (2009) proposed both a reduction in rumination and an increase in concreteness of thinking as potential mechanisms of action for RFCBT and for CBT in general. These mechanisms need not be mutually exclusive and a developing body of evidence now suggests that training individuals to think more concretely during emotionally distressing experiences, by focusing on specific, contextual details, leads to a reduction in rumination (Watkins, Baeyens & Read, 2009; Watkins & Moberly, 2009). However, Watkins (2009) suggested that "it remains unresolved whether this causal relationship is bidirectional... although this seems plausible given that rumination ("being stuck in your head") may reduce attention to the external world and thereby reduce awareness of contextual details" (p. 13).

The present study experimentally investigated the potential bidirectionality of the relationship between rumination and concreteness of thinking in-the-moment i.e. "attention to the external world" and "awareness of contextual details", as proposed by Watkins (2009). An experimental design was adopted to investigate causality. It was hoped that the results would contribute to the ongoing discussion regarding the proposed mechanisms of action for RFCBT. Additionally, it is notable that Watkins and colleagues did not draw a distinction between reflection and brooding, in the

development of RFCBT and concreteness training. As such, this study considered both reflection and brooding, in the context of concreteness of thinking.

The present study aimed to answer the following two questions:

1. Does rumination cause individuals to think less concretely in-the-moment i.e. more abstractly, in line with the suggestion of Watkins (2009)?
2. Do reflection and brooding differ according to their effects on concreteness of thinking in-the-moment?

The experimental hypotheses were that:

1. Inducing rumination, both reflection and brooding respectively, would decrease concreteness of thinking in-the-moment i.e. increasing abstractness, as measured by the concreteness of participants' descriptions of visual scenes;
2. Inducing rumination, both reflection and brooding respectively, would decrease concreteness of thinking in-the-moment i.e. increasing abstractness, as measured by the concreteness of participants' descriptions of their own subjective awareness.

The differential effects of reflection and brooding on concreteness of thinking in-the-moment were difficult to predict, given no previous research considering both the two factor model of rumination and concreteness of thinking, to the authors' knowledge. As such, no explicit hypotheses were generated regarding the second research question.

Method

Design

A between-subjects experiment was designed. The dependent variables (DVs) were:

1. Pre to post-independent variable (IV) difference in concreteness of thinking in-the-moment, as measured by the concreteness of participants' descriptions of visual scenes;
2. Pre to post-IV difference in concreteness of thinking in-the-moment, as measured by the concreteness of participants' descriptions of their own subjective awareness i.e. whatever they were aware of.

The IV's three levels were directly linked to the experimental conditions devised, which were:

1. Reflection induction condition;
2. Brooding induction condition;
3. Control condition.

Differences in age (Sütterlin, Paap, Babic, Kübler & Vögele, 2012), gender (Nolen-Hoeksema, Larson & Grayson, 1999) and level of depressive symptomatology (Treynor et al., 2003) have all been associated with the propensity to engage in rumination. As such, they were measured as covariates, given the intention to experimentally induce rumination. Trait rumination and overall verbosity of descriptions were also measured as covariates.

Participants

A non-clinical sample of volunteers was recruited. Experimental research with non-clinical participants has been used in the development of RFCBT to-date (see Watkins

et al., 2008) and circumvents the ethical dilemma of inducing rumination in clinical participants. The majority of volunteers were students at the University of Hull, who were recruited via the university email system and via the psychology department's online Research Participation System. As the measurement of concreteness of thinking in-the-moment had not been attempted previously, it was impossible to estimate effect sizes and carry out a sample size calculation prior to running the experiment. By way of precedent, Watkins et al. (2008) recruited 21 non-clinical participants to each of their experimental conditions. In this study, 20 participants were randomly allocated to each of the three experimental conditions, resulting in a total sample size of 60. Table 1. summarises the characteristics of the sample. Analyses of variance revealed no significant differences between conditions in relation to any of the characteristics included in Table 1.

Table 1. Characteristics of participants

Characteristic	Condition							
	Reflection		Brooding		Control		Total	
	M	SD	M	SD	M	SD	M	SD
Age (years)	25.80	8.17	27.20	11.28	23.95	5.39	25.65	8.50
Gender (%)								
Female	55		55		75		62	
Male	45		45		25		38	
BDI-II score	11.75	8.58	13.40	9.78	11.75	6.66	12.30	8.33
RRS reflection score	10.70	4.00	11.25	3.02	10.05	3.03	10.67	3.36
RRS brooding score	10.75	2.95	10.50	3.28	10.10	2.40	10.45	2.87
RRS total score	49.10	12.38	48.20	9.42	46.40	10.13	47.90	10.59

BDI-II, Beck Depression Inventory II; RRS, Ruminative Responses Scale.

Measures

A brief demographic questionnaire was used to ascertain participants' age and gender. The BDI-II (Beck et al., 1996) was used to measure level of depressive

symptomatology, given evidence for its reliability and validity in non-clinical participants and a relatively brief administration time of 5-10 minutes. The BDI-II achieved a Cronbach's alpha of 0.89 in the present sample, indicating good internal consistency. The RRS (Nolen-Hoeksema & Morrow, 1991) was used to measure trait rumination, incorporating both reflection and brooding items. A great deal of evidence supports good reliability and validity of the RRS in non-clinical participants (see Luminet, 2004). The RRS achieved a Cronbach's alpha of 0.90 in the present sample, indicating good internal consistency.

Concreteness of thinking in-the-moment was measured by asking participants to provide written descriptions of visual scenes taken from the "family pictures" subtest of the Wechsler Memory Scale – Third Edition (WMS-III; Wechsler, 1997; DV1). These pictures were chosen given matching against one another with respect to complexity and content during WMS-III development. Concreteness of thinking in-the-moment was also measured by asking participants to provide written descriptions of whatever they were aware of (DV2).The concreteness of participants' descriptions i.e. the extent to which they described specific, contextual details, was measured by coding responses according to a bespoke coding frame developed by the authors (see Appendix B.). The operationalisation of concreteness and its coding is described in the data extraction and transformation subsection.

During the development of the protocol, a question arose regarding whether written descriptions would yield sufficient data for subsequent analysis or whether verbal descriptions would need to be taken. In this vein, a small pilot study was undertaken (n = 5), which involved all aspects of the procedure included in the main study, with the exception of the measurement of covariates. The results demonstrated no significant

differences in the quantity of data yielded by written and verbal means. As such, written descriptions were taken, as this method could be better operationalised.

Procedure

At the beginning of each experimental session, issues of informed consent, confidentiality and right to withdraw were discussed. Participants were then asked to complete the demographic questionnaire, the BDI-II and the RRS. Next, participants described two visual scenes and whatever they were aware of. Once complete, participants were presented with one of the following sets of written instructions:

1. Reflection induction condition

Spend the next five minutes following the instructions below. You will not be asked to disclose your thoughts during this time to the experimenter.

Think about a recent event in which you felt low in mood.

Analyse how you felt at the time.

Analyse why you felt that way.

Analyse what you were thinking at the time.

Analyse aspects of your personality that may have contributed to how you felt.

2. Brooding induction condition

Spend the next five minutes following the instructions below. You will not be asked to disclose your thoughts during this time to the experimenter.

Think about a recent situation that you wish had gone better.

Analyse what you may have done to deserve what happened.

Analyse why the situation may have gone differently for other people.

Analyse why you reacted in the way that you did.

Analyse the reasons why you didn't handle the situation better.

3. Control condition

Spend the next five minutes doing nothing. You will not be asked to disclose your thoughts during this time to the experimenter.

The instructions were derived from the reflection and brooding items of the RRS. Each item was reworded so that it read as an instruction. Similar rumination induction conditions have been used in the literature to-date (see Watkins, 2008). During the pilot study, described in the measures subsection, participants were asked to comment on whether or not they were able to follow the instructions presented during the five minute period. This served as a rudimentary IV manipulation check. Participants unanimously responded that they had been able to follow all of the instructions presented. Equally, four of the five pilot participants said that very few other thoughts had entered their minds during the five minute period. However, one participant mentioned that he had been somewhat concerned about whether he would be asked to disclose what he had been thinking about to the experimenter. As such, the sentence "you will not be asked to disclose your thoughts during this time to the experimenter" was added to each set of instructions, reducing the confounding effect of evaluation apprehension.

Immediately following the experimental/control conditions, participants were asked to describe two different visual scenes and whatever they were aware of. Once complete, participants were fully debriefed regarding the nature of the experiment and informed again of their right to withdraw. All participants were then provided with information on how to access additional mental health support in the event that participation had caused or exacerbated any emotional distress.

Data extraction and transformation

Participants' descriptions of visual scenes and their own subjective awareness were coded by the principal researcher according to a bespoke coding frame developed by the authors (see Appendix B.). Category descriptions were based on Watkins and colleagues' extensive literature on concreteness of thinking (see Watkins, 2009). The coding frame enabled each phrase within participants' descriptions to be coded as either concrete i.e. descriptions of specific, contextual details, or abstract i.e. assumptions and interpretations. Coding generated count data for concrete and abstract phrases within each description. Learning how to apply the coding frame was an iterative process that involved the development of an exemplar coded description, based on pilot data (see Appendix C.). This exemplar then informed future decisions on the parsing of descriptions into phrases.

Ten participants' descriptions of visual scenes and subjective awareness were coded by both the principal researcher and an independent rater to assess the coding frame's potential inter-rater reliability. A mean intraclass correlation coefficient (ICC) of 0.95 indicated a very high level of agreement between coders on the number of concrete phrases within descriptions of visual scenes and a mean ICC of 0.75 indicated a less high but still strong level of agreement between coders on the number of abstract phrases within descriptions of visual scenes. A mean ICC of 0.97 indicated a very high level of agreement between coders on the number of concrete phrases within descriptions of subjective awareness and a mean ICC of 0.91 indicated a very high level of agreement between coders on the number of abstract phrases within descriptions of subjective awareness.

The number of concrete phrases generated by each participant for the two visual scenes presented prior to manipulation of the IV were added together, as were the number of abstract phrases. The total number of concrete phrases was then divided by the total number of abstract phrases generating a 'concreteness quotient' (CQ). A logarithm to the base 10 of this CQ was taken so that participants' CQs would be normally distributed. CQs were also generated for post-IV visual scenes and for pre and post-IV subjective awareness.

Data analysis

Paired t-tests were carried out to explore pre to post-IV differences in CQs for visual scenes and subjective awareness within each condition. Two univariate analyses of covariance (ANCOVA) were carried out to explore differential effects between all three conditions (IV) on pre to post-IV differences in CQs for visual scenes (DV1) and subjective awareness (DV2) respectively, while statistically controlling for the effects of age, gender, BDI-II score, RRS total score and verbosity (covariates). A further six ANCOVA were carried out to explore differential effects between pairs of conditions on the two DVs. Finally, Pearson's product moment correlation coefficients (Pearson's *r*) were calculated to investigate relationships between variables.

Results

Within-subjects effects

Table 2. summarises mean pre to post-IV differences in concreteness in the description of visual scenes and subjective awareness by condition. A mean difference of less than zero indicates a decrease in concreteness.

Table 2. Mean pre to post-IV differences in CQs for visual scenes and subjective awareness by condition

Condition	Dependent variable			
	Visual scenes		Subjective awareness	
	M	SD	M	SD
Reflection (n = 20)	-0.15 *	0.20	-0.15	0.80
Brooding (n = 20)	-0.05	0.18	0.10	0.53
Control (n = 20)	-0.12 *	0.21	-0.13	0.48
Total (n = 60)	-0.11 *	0.20	-0.06	0.62

* Significant difference ($p < 0.05$).

Significant decreases in concreteness in the description of visual scenes were found in the reflection, t = -3.27, df = 19, p = 0.004, and control, t = -2.47, df = 19, p = 0.023, conditions and across the whole sample, t = -4.11, df = 59, $p < 0.001$. While a decrease in concreteness was also found in the brooding condition, the difference did not reach significance, t = -1.31, df = 19, p = 0.206. Figure 1. graphically illustrates these data.

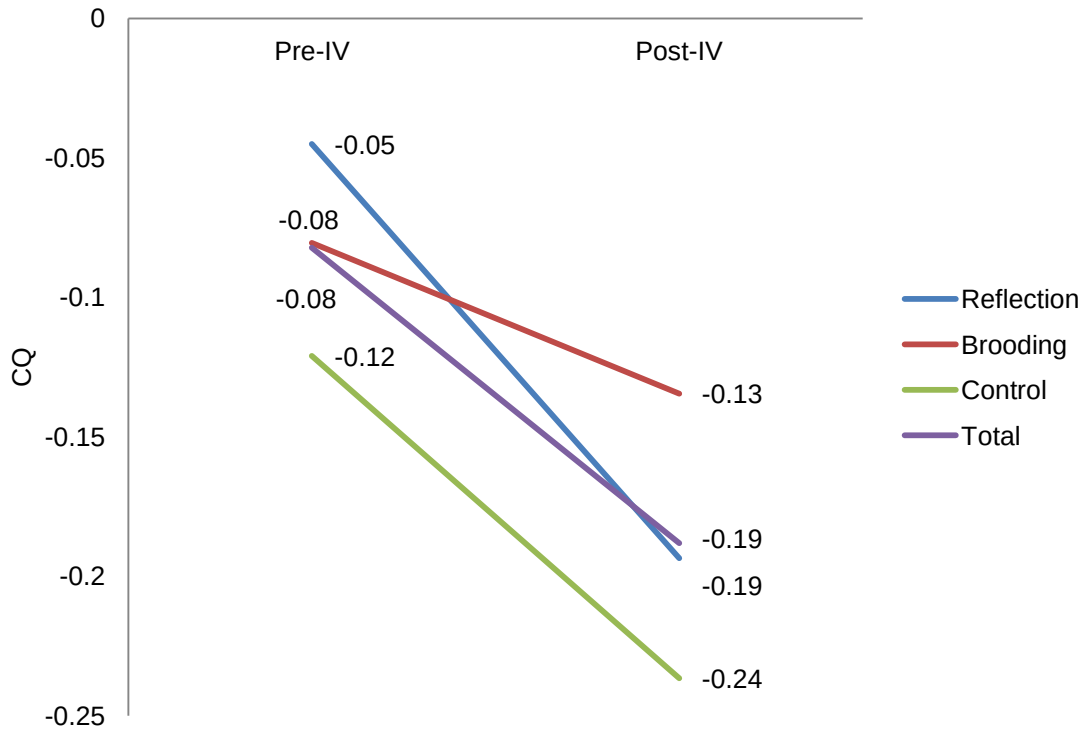

Figure 1. Mean CQs for visual scenes pre to post-IV by condition

No significant decreases in concreteness in the description of subjective awareness were found. While decreases in concreteness were found in the reflection, t = -0.85, df = 19, p = 0.408, and control, t = -1.23, df = 19, p = 0.234, conditions and across the whole sample, t = -0.78, df = 59, p = 0.437, none of these differences reached significance. An increase in concreteness was found in the brooding condition but the difference did not reach significance, t = 0.82, df = 19, p = 0.421. Figure 2. graphically illustrates these data.

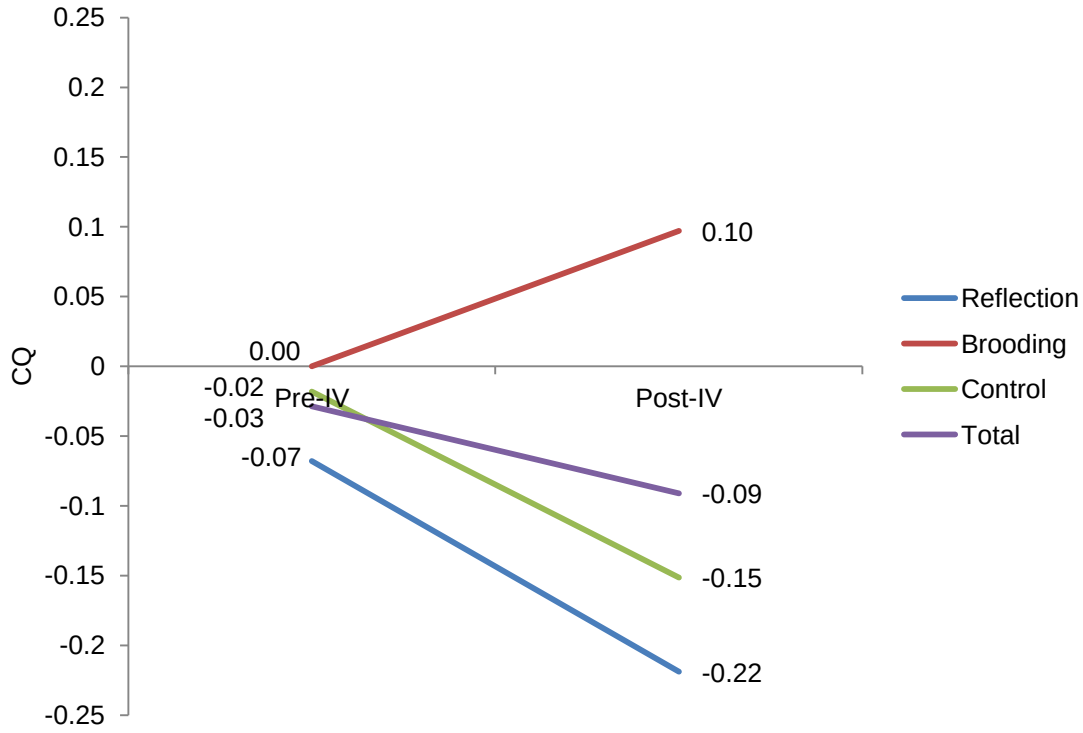

Figure 2. Mean CQs for subjective awareness pre to post-IV by condition

Between-subjects effects

ANCOVA revealed no significant main effect of condition on pre to post-IV differences in concreteness in the description of visual scenes, $F(2,52) = 1.12$, p = 0.334, partial η^2 = 0.04. Equally, none of the covariates explained a significant proportion of the variance. ANCOVA revealed no significant main effect of condition on pre to post-IV

differences in concreteness in the description of subjective awareness, $F(2,52) = 0.55$, $p = 0.579$, partial $\eta^2 = 0.02$. Again, none of the covariates explained a significant proportion of the variance.

No significant main effects of condition were found when comparing the reflection and brooding conditions on pre to post-IV differences in concreteness in the description of visual scenes, $F(1,33) = 2.85$, $p = 0.101$, partial $\eta^2 = 0.08$, and subjective awareness, $F(1,33) = 0.93$, $p = 0.341$, partial $\eta^2 = 0.03$. The covariate, RRS total score, explained a significant proportion of the variance in pre to post-IV differences in concreteness in the description of visual scenes, $F(1,33) = 4.98$, $p = 0.033$, partial $\eta^2 = 0.13$. Higher trait rumination scores were predictive of lesser reductions in concreteness in the description of visual scenes, when comparing the reflection and brooding conditions.

No significant main effects of condition were found when comparing the reflection and control conditions on pre to post-IV differences in concreteness in the description of visual scenes, $F(1,33) = 1.05$, $p = 0.312$, partial $\eta^2 = 0.03$, and subjective awareness, $F(1,33) = 0.40$, $p = 0.531$, partial $\eta^2 = 0.01$. The covariate, verbosity, explained a significant proportion of the variance in pre to post-IV differences in concreteness in the description of visual scenes, $F(1,33) = 4.30$, $p = 0.046$, partial $\eta^2 = 0.12$. Greater verbosity was predictive of lesser reductions in concreteness in the description of visual scenes, when comparing the reflection and control conditions.

Finally, no significant main effects of condition were found when comparing the brooding and control conditions on pre to post-IV differences in concreteness in the description of visual scenes, $F(1,33) = 0.13$, $p = 0.722$, partial $\eta^2 < 0.01$, and subjective

awareness, $F(1,33) = 0.87$, $p = 0.302$, partial $\eta^2 = 0.03$. None of the covariates explained a significant proportion of the variance.

Relationships between variables

A very strong and significant positive correlation was found between pre-IV CQ for visual scenes and post-IV CQ for visual scenes, $r = 0.84$, $n = 60$, $p < 0.001$. Pre-IV CQ accounted for 70% of the variance in post-IV CQ. Higher levels of concreteness in the description of visual scenes prior to manipulation of the IV were strongly predictive of higher levels of concreteness afterwards. Significant positive correlations were found between pre-IV CQ for visual scenes and verbosity, $r = 0.54$, $n = 60$, $p < 0.001$, and between post-IV CQ for visual scenes and verbosity, $r = 0.62$, $n = 60$, $p < 0.001$. Higher levels of verbosity were predictive of higher levels of concreteness in the description of visual scenes both prior to and following manipulation of the IV. Significant negative correlations were found between pre-IV CQ for visual scenes and RRS reflection, $r = -0.28$, $n = 60$, $p = 0.034$, RRS brooding, $r = -0.30$, $n = 60$, $p = 0.019$, and RRS total, $r = -0.35$, $n = 60$, $p = 0.007$, scores. Higher levels of trait rumination were predictive of lower levels of concreteness in the description of visual scenes prior to manipulation of the IV.

A very strong and significant positive correlation was found between pre-IV CQ for subjective awareness and post-IV CQ for subjective awareness, $r = 0.77$, $n = 60$, $p < 0.001$. Pre-IV CQ accounted for 59% of the variance in post-IV CQ. Higher levels of concreteness in the description of subjective awareness prior to manipulation of the IV were strongly predictive of higher levels of concreteness afterwards.

Discussion

The present study investigated whether experimentally inducing rumination causes individuals to become less concrete i.e. more abstract, in their thinking in-the-moment. This effect was predicted by Watkins (2009). A discussion is ongoing regarding whether a reduction in rumination or an increase in concreteness of thinking accounts for the effects of RFCBT. It was hoped that the results of this study would contribute to the discussion by further describing the relationship between rumination and concreteness of thinking.

Does rumination cause individuals to think less concretely in-the-moment?

Concreteness in the description of visual scenes decreased in both the reflection and brooding conditions. However, the difference only reached significance in the reflection condition. Concreteness in the description of visual scenes also significantly decreased in the control condition. Overall, condition had no significant effect on pre to post-IV difference in concreteness in the description of visual scenes. As such, it was not possible to accept the first experimental hypothesis that inducing rumination, both reflection and brooding respectively, would decrease concreteness of thinking in-the-moment i.e. increasing abstractness, as measured by the concreteness of participants' descriptions of visual scenes, at a confidence level of 95%.

Concreteness in the description of subjective awareness decreased in the reflection condition but increased in the brooding condition. However, neither of the differences reached significance. Concreteness in the description of subjective awareness also decreased in the control condition but the difference did not reach significance. Overall, condition had no significant effect on pre to post-IV difference in concreteness in the description of subjective awareness. As such, it was not possible to accept the second

experimental hypothesis that inducing rumination, both reflection and brooding respectively, would decrease concreteness of thinking in-the-moment i.e. increasing abstractness, as measured by the concreteness of participants' descriptions of their own subjective awareness, at a confidence level of 95%.

Do reflection and brooding differ according to their effects on concreteness of thinking in-the-moment?

While concreteness in the description of visual scenes significantly decreased in the reflection condition and not in the brooding condition, type of rumination induced had no significant effect on pre to post-IV difference in concreteness in the description of visual scenes. Equally, while concreteness in the description of subjective awareness decreased in the reflection condition and increased in the brooding condition, albeit with neither difference reaching significance, type of rumination induced had no significant effect on pre to post-IV difference in concreteness in the description of subjective awareness. As such, it was not possible to conclude any differential effects of reflection and brooding on concreteness of thinking in-the-moment.

Potential explanations for null results: conceptual and methodological issues

The following section describes potential hypotheses regarding the null results found. The first three provisional hypotheses explain the results in conceptual terms. The remaining hypotheses assume methodological shortcomings in the experimental design and explain the results accordingly.

Concreteness of thinking in-the-moment is a stable individual difference

Concreteness of thinking in-the-moment may represent a stable individual difference, which is resistant to the experimental induction of rumination. In other words, contrary

to Watkins' (2009) suggestion, "attention to the external world" and "awareness of contextual details" may be resistant to experimental attempts to get people "stuck in [their] head". This hypothesis is supported by the very strong positive correlations found between pre-IV CQ for visual scenes and post-IV CQ for visual scenes and between pre-IV CQ for subjective awareness and post-IV CQ for subjective awareness. Concreteness of thinking in-the-moment prior to manipulation of the IV was a better predictor of concreteness afterwards than condition or any other variable. However, evidence against this hypothesis includes the finding that concreteness in the description of visual scenes significantly decreased in the reflection and control conditions.

Higher levels of trait rumination reduce the impact of rumination induction

Somewhat counterintuitively, it is possible that participants with a greater propensity to naturally engage in rumination are less affected by experimental attempts to artificially induce rumination than those with a lesser propensity. In other words, participants high in trait ruination may have been in a ruminative mindset both prior to and following manipulation of the IV, while participants low in trait rumination may have only entered into a ruminative mindset following manipulation of the IV. This was impossible to verify, given no measurement of state rumination either prior to or following manipulation of the IV. This methodological issue is discussed further below. This hypothesis is based on the finding that higher trait rumination scores were predictive of lesser reductions in concreteness in the description of visual scenes, when comparing the reflection and brooding conditions. However, powerful evidence against this hypothesis includes the finding that trait rumination failed to explain a significant proportion of the variance in pre to post-IV differences in concreteness in all other analyses concerning the description of both visual scenes and subjective awareness.

Higher levels of verbosity preserve concreteness

It is also possible that participants with a propensity to describe visual scenes and their own subjective awareness with greater verbosity are more likely to include a large number of concrete phrases i.e. specific, contextual details, as a result of their comprehensive approach. This hypothesis is based on the finding that greater verbosity was predictive of lesser reductions in concreteness in the description of visual scenes, when comparing the reflection and control conditions. This hypothesis is supported by the finding that higher levels of verbosity were predictive of higher levels of concreteness in the description of visual scenes both prior to and following manipulation of the IV. However, powerful evidence against this hypothesis includes the finding that verbosity failed to explain a significant proportion of the variance in pre to post-IV differences in all other analyses concerning the description of both visual scenes and subjective awareness.

Rumination occurred in the control condition

The finding that concreteness in the description of visual scenes significantly decreased in the control condition is likely to have contributed to the lack of main effect of condition on pre to post-IV differences in concreteness in the description of visual scenes. Concreteness in the description of subjective awareness also decreased in the control condition, although the difference did not reach significance. These results may reflect the occurrence of rumination in the control condition. Watkins (2008) discussed the advantages and disadvantages on adopting a "do nothing" control condition when inducing rumination in dysphoric participants. Such a passive condition may allow naturally occurring rumination to continue, whereas an active distraction condition may prevent this. A potential problem with an active distraction control condition, however,

is that it becomes more difficult to attribute between-subjects effects to the induction of rumination, which is why a passive control condition was adopted in this study.

Evidence against this hypothesis includes the finding that mean BDI-II scores fell below the clinical range in all three conditions and there were no significant differences between conditions in relation to level of depressive symptomatology or trait rumination. As such, it is unlikely that participants in the control condition were more likely to engage in naturally occurring rumination than participants in the experimental conditions but it is impossible to rule out the possibility that they were ruminating. Future research examining the research questions addressed would benefit from the inclusion of an active distraction control condition.

Rumination was not induced in the experimental conditions

Rumination may not have been successfully induced in the experimental conditions. This hypothesis is impossible to rule out, given the absence of an IV manipulation check in the main study. Future research examining the research questions addressed would benefit from the inclusion of such a check. Evidence against this hypothesis includes the fact that a rudimentary IV manipulation check was incorporated into the pilot study carried out prior to the main study. Participants unanimously responded that they had been able to follow all of the instructions presented. Equally, four of the five pilot participants said that very few other thoughts had entered their minds during the five minute period. The concern of the remaining pilot participant, that he would be asked to discuss what he had been thinking about to the experimenter, was addressed through the inclusion of a statement to the contrary in the instructions.

Concreteness of thinking in-the-moment was not measured with validity

The measurement of concreteness in the description of visual scenes and subjective awareness may not have been capturing the construct that Watkins (2009) alluded to as "attention to the external world" and "awareness of contextual details", which has been referred to as concreteness of thinking in-the-moment in this study. This was always a risk in the development of the study, as concreteness of thinking in-the-moment has not been measured previously, to the authors' knowledge. This hypothesis is impossible to rule out and concerns the construct validity of the DVs, which has still yet to be empirically verified.

Evidence against this hypothesis includes the finding of negative correlations between pre-IV CQ for visual scenes and RRS reflection, RRS brooding and RRS total scores. Higher levels of trait rumination were predictive of lower levels of concreteness in the description of visual scenes prior to manipulation of the IV. This supports the relationship between rumination and concreteness of thinking predicted in the literature (see Watkins, 2009). However, no such correlations were found between pre-IV CQ for subjective awareness and RRS scores, which calls into question the construct validity of subjective awareness as an analogue of thinking in-the-moment. Future research examining the research questions addressed would benefit from the inclusion of additional novel ways of capturing the construct of concreteness that Watkins (2009) alluded to.

Recommendations regarding future research

Future experimental research aimed at answering the present study's research questions would benefit from the inclusion of an active distraction control condition, which reduces the likelihood that rumination is occurring in the control condition. Future

research would also benefit from the inclusion of an IV manipulation check, which explores state rumination both prior to and following manipulation of the IV and ensures that rumination is being effectively induced as part of the procedure. Watkins and Moberly (2009) modified the RRS to measure state rumination but defined this as the frequency with which participants had been ruminating over the last week. The proposed IV manipulation check would need to include a state rumination measure that examines rumination in-the-moment. This would be difficult to achieve, as the very act of measuring state rumination may interfere with the extent to which participants are "stuck in [their] head".

Future research would also benefit from further consideration of the construct of concreteness of thinking in-the-moment and the development of additional methods of measurement, which are distinct from the description of visual scenes and subjective awareness. For example, it would be of interest to ask participants to verbally narrate their experience of attempting to solve unsolvable anagrams i.e. experimentally induced failure, both before and after a rumination induction. Participants' pre and post-IV narratives could then be coded and the difference in concreteness analysed. This protocol would allow for the measurement of participants' concreteness of thinking in-the-moment during an emotionally distressing experience, which may benefit from improved construct validity.

It would also be of interest to incorporate the measurement of concreteness of thinking pre and post-intervention into clinical research into RFCBT. This would allow for exploration of the effect of manipulating rumination over a much longer period of time i.e. as an intervention, on concreteness of thinking.

Conclusions and implications

The present study built on evidence that training individuals to think more concretely during emotionally distressing experiences reduces the occurrence of rumination (Watkins, Baeyens & Read, 2009; Watkins & Moberly, 2009) and addressed Watkins' (2009) question regarding the potential bidirectionality of that relationship.

If the experimental hypotheses had been accepted and inducing rumination had reduced concreteness of thinking in-the-moment, an implication may have been that clinical approaches to depression, which aim to target rumination e.g. RFCBT (Watkins et al., 2007) and mindfulness-based interventions (see Brooks and Clarke, 2013), should be expected to affect concreteness of thinking. This would have provided evidence for the interrelatedness of Watkins' (2009) two proposed mechanisms of action for RFCBT and CBT in general. However, as the experimental hypotheses could not be accepted, this calls into question either the proposed bidirectionality of the relationship between rumination and concreteness of thinking or the methodology of this study. In either case, future experimental and clinical research must be carried out if the research questions are to be answered conclusively.

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PART THREE

Appendix A. Modified Downs and Black (1998) checklist for methodological quality

Reporting

1. Is the hypothesis/aim/objective of the study clearly described?

Yes = 1 No = 0

2. Is the measurement of rumination clearly described in the Introduction or Methods section?[1]

Yes = 1 No = 0

3. Are the characteristics of the patients included in the study clearly described?

Yes = 1 No = 0

4. Are the interventions of interest clearly described?

Yes = 1 No = 0

5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?

Yes = 2 Partially = 1 No = 0

6. Are the main findings relating to rumination clearly described?[1]

Yes = 1 No = 0

7. Does the study provide estimates of the random variability in the data for the main findings relating to rumination i.e. are standard deviations reported?[1]

Yes = 1 No = 0

8. Have actual probability values been reported for the main findings relating to rumination (e.g. 0.035 rather than <0.05) except where the probability value is less than 0.001?[1]

Yes = 1 No = 0

External validity

9. Were the participants representative of the depressed population i.e. was depression reliably assessed?[1,2]

Yes = 2 No = 0 Unable to determine = 0

10. Was the mindfulness-based intervention representative of a treatment that the depressed population receive i.e. was a reliable treatment protocol followed?[1,2]

MBSR = 8 x 2½-hour classes + one all-day class + homework on 6/7 days of the week

MBCT = 8 x 2-hour classes + one-all day class + daily homework

Yes = 2 No = 0 Unable to determine = 0

Internal validity - bias

11. Was an attempt made to blind those measuring the main findings relating to rumination?[1]

Yes = 1 No = 0 Unable to determine = 0

12. If any of the main findings relating to rumination were based on "data dredging", was this made clear?[1]

Yes = 1 No = 0 Unable to determine = 0

13. In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?

Where follow-up was the same for all study patients the answer should yes. If different lengths of follow-up were adjusted for by, for example, survival analysis the answer should be yes. Studies where differences in follow-up are ignored should be answered no.

Yes = 1 No = 0 Unable to determine = 0

14. Were the statistical tests used to assess the main findings relating to rumination appropriate?[1]

The statistical techniques used must be appropriate to the data. For example nonparametric methods should be used for small sample sizes. Where little statistical analysis has been undertaken but where there is no evidence of bias, the question should be answered yes. If the distribution of the data (normal or not) is not described it must be assumed that the estimates used were appropriate and the question should be answered yes.

Yes = 1 No = 0 Unable to determine = 0

15. Was compliance with the intervention(s) reliable i.e. were participants practicing mindfulness?[1,2]

Yes = 2 No = 0 Unable to determine = 0

16. Was the rumination measure used accurate (valid and reliable)?[1,2]

Yes = 2 No = 0 Unable to determine = 0

Internal validity - confounding

17. Was the study controlled?[3]

Yes = 2 No = 0

18. Were study subjects randomised to intervention groups?

Yes = 1 No = 0 Unable to determine = 0

19. Was there adequate adjustment for confounding in the analyses from which the main findings relating to rumination were drawn?[1]

This question should be answered no for trials if: the main conclusions of the study were based on analyses of treatment rather than intention to treat; the distribution of known confounders in the different treatment groups was not described; or the distribution of known confounders differed between the treatment groups but was not taken into account in the analyses. In non-randomised studies if the effect of the main confounders was not investigated or confounding was demonstrated but no adjustment was made in the final analyses the question should be answered as no.

Yes = 1 No = 0 Unable to determine = 0

Power

20. Did the study have sufficient power to detect a clinically important effect where the probability value for a difference being due to chance is less than 5%?[2]

Yes = 1 No = 0 Unable to determine = 0

[1]Wording modified

[2]Weighting of scores altered

[3]Item added

Appendix B. Coding frame

The coder should determine whether each phrase within a written description should be categorised as concrete or abstract based on the following descriptions.

Category	Description
Concrete	Descriptive phrases that may be used to answer what and how questions. Phrases refer to specific, contextual details and known facts that do not rely on subjective judgement to substantiate.
Abstract	Assumptive and interpretive phrases that may be used to answer why questions. Phrases refer to meanings and implications that require subjective judgement to substantiate.

Each written description should yield a number of concrete and a number of abstract phrases. If the ratio of concrete to abstract phrases does not fit with the coder's overall impression of the description this should signal a re-coding of the description.

Appendix C. Exemplar coded description

The scene is a family [assumptive therefore abstract description of collective] enjoying [assumptive therefore abstract description of experience] a barbeque [concrete description of specific detail] in a local park [assumptive therefore abstract description of location].

The scene shows a man [concrete description of specific detail] (I assume the father) [assumptive therefore abstract description of person] cooking [concrete description of activity]. Mum is absent [assumptive therefore abstract] and a younger women [assumptive therefore abstract description of person], maybe the daughter [assumptive therefore abstract description of person], is playing Frisbee [concrete description of activity] with the family dog [assumptive therefore abstract description of animal]. An older man [assumptive therefore abstract description of person] is looking on [concrete description of activity], sat on a picnic table [concrete description of specific detail]. I assume he may be the grandfather [assumptive therefore abstract description of person].

Food is about to be served [assumptive therefore abstract description of future event] as there is a serving platter waiting to be used on the table [concrete description of specific detail]. The scene is outdoors [concrete description of location] and seems calm, happy and peaceful [assumptive therefore abstract description of ambiance].

Appendix D. Reflective statement

Beginning

When I think back to my rationale for beginning a piece of research looking at rumination and psychological treatments for depression, there are two things that I am reminded of. Firstly, the person to whom this thesis is dedicated taught me a great deal about the personal experience of living through a lifetime of recurrent depression and my experience of listening to her instilled in me a deep interest in mood disorders. Secondly, throughout my time in education I have been passionate about the experimental method, I think in the belief that it will one day help me to understand the complexity of depression. I suppose it strikes me now that this is a personal piece of research and represents the culmination of various interests that have carried me onto the doctorate.

I remember choosing to work with Chris because his interests in mood disorders and in experimental research fit well with mine. Early meetings involved general discussions about what Chris would like to supervise, which led to a conversation about rumination. I knew very little about rumination at that time but what helped to change that was discovering Watkins' work, which I found both accessible and interesting. Watkins' work led directly to an idea for an experiment, based on his paper on mechanisms to improve cognitive behavioural treatments for depression. If I was to begin the development of a piece of experimental research over again, I would follow the same process of finding an accessible research stream and identifying research questions from it. The simplicity of the research questions and their grounding in the existing literature has helped to contain my anxiety throughout the research process.

Development

Once a research question had been identified, Chris and I got to work in the development of the procedure and the materials that this would require. This was the most enjoyable stage of the research process for me, as the process of thinking, particularly about the measurement of concreteness of thinking in-the-moment, was extremely interesting and didn't feel limited by an abundance of existing methodology. On reflection, I wish I had continued to read more globally on the topic of rumination at that time, as a better understanding of the research context would have been helpful prior to write-up.

After several months of planning the methodology, in conjunction with the submission of several research proposals and the delivery of a presentation to trainees and members of the course team, an ethics proposal was submitted to the Post Graduate Medical Institute's (PGMI) ethics committee for a small pilot study. Running a pilot study enabled the refinement of the procedure and the materials developed. As Chris and I had decided to recruit non-clinical participants to the experiment, partially on ethical grounds, I did not have to seek ethical approval from NHS research ethics committees, which helped to accelerate the process considerably. If I was to attempt a similar piece of research in the future and the limits on completion time were less stringent, I would be tempted to recruit clinical participants and to address the resulting ethical implications in consultation with NHS research committees. However, I do not regret the decision to recruit non-clinical participants to this piece of research, as it allowed for the recruitment of participants over a longer period of time and from a wider population.

Recruitment

Once PGMI ethical approval had been granted for the main study, I was able to begin the recruitment process. I remember feeling anxious about the prospect of beginning recruitment, as I was aware of my total reliance on the good will of volunteers. Once the materials were ready, I began to recruit participants via the university email system. This was a slow process, which required the approval and forwarding of my recruitment email by administrators within the university's departments. My anxiety was alleviated somewhat once the first few participants had taken part and the procedure appeared to work well. However, soon after, responses began to dwindle and the university's summer break began, which removed the vast majority of my potential research participants from Hull. As such, recruitment came to a standstill for approximately four months. In hindsight, I wish I had better anticipated the exodus of potential participants, so that I had been able to think of alternative recruitment strategies.

During the university's summer break, I became less focused on the research process in general. I think that this was partly to do with limited recruitment opportunities but I also think that I felt like I needed a break from the research process at that time. On reflection, I have mixed feelings about that period of reduced focus. On the one hand, I wish I had remained more in touch with the process, perhaps by continuing to read around the subject, but on the other hand, I think I approached the process with renewed enthusiasm once the autumn term arrived. In response to limited replies via the university email system, Chris recommended that I should contact a member of the undergraduate psychology department, to enquire about the use of their Research Participation System for recruitment. The use of that system was extremely valuable and enabled acceleration of the recruitment process, without which I wouldn't have reached the sample size that I eventually did.

Systematic literature review

With recruitment underway once again, the time came to begin developing a systematic literature review question. In contrast to the graded way in which Chris and I developed the empirical research, it felt as though the review had to be developed much more quickly. In thinking about the potential clinical implications of the empirical research, it became apparent that it would be helpful to think about a psychological treatment aimed at affecting rumination, other than rumination-focused cognitive behaviour therapy. As such, a review question arose regarding the effect of mindfulness-based interventions on rumination. While reviewing the literature, it appealed to me that I was exploring studies conducted with clinical participants, which I felt balanced out the recruitment of non-clinical participants to the empirical research. However, if I conducted a similar review in the future, I would consider including both clinical and theoretical papers, which I think would improve the potential for discussion.

Data analysis

By March of this year, I had recruited an appropriately sized sample of 60 participants. As such, I was able to begin the process of coding participants' descriptions and entering the resulting quantitative data into an SPSS data file. Given the time-consuming nature of this process, I would begin data extraction much earlier in the process i.e. during recruitment, if I was to conduct a similar piece of research in the future. Once data had been inputted into SPSS, it was then possible to run the data analyses that had been planned, in order to answer the research questions asked. As it quickly became apparent that it would not be possible to accept the experimental hypotheses proposed, my initial reaction was one of disappointment. However, following meetings with Chris and Eric, my disappointment turned into curiosity about the results, as my focus turned to the write-up.

Write-up

Given the briefer time period available for completion of the systematic literature review, the review was conducted and written-up almost simultaneously. I found this helpful, as the theoretical concepts underpinning the review were fresh in my mind as I attempted to place the findings into context. However, given the longer time period between beginning and writing-up the empirical paper, it was necessary to re-address the background literature in some detail before placing the findings into context. This had advantages and disadvantages. On the one hand, keeping abreast the wider literature on rumination throughout the research process may have facilitated the process of writing-up. However, the need to re-address the literature in some detail at write-up forced me to think more clearly about theoretical concepts and how they related to the findings, having spent over a year immersed in methodology. On balance, if I was to attempt a similar piece of research in the future, I would spend longer immersed in the background literature relating to the research questions before developing methodology.

Journal selection

The decision to write both the systematic literature review and the empirical paper for submission to Behaviour Research and Therapy was based on the journal's reputation for publishing studies that explore the mechanisms of action of psychological treatments for clinical disorders. Both the review paper and the empirical paper included in this thesis focus on rumination in the mechanisms of action of psychological treatments for depression. The relevance of this thesis to the journal is evidenced by Watkins' presence on the Editorial Board. Behaviour Research and Therapy also has a current impact factor of 3.295.

Appendix E. Author Information Pack: Behaviour Research and Therapy

Appendix F. Ethical approval (removed prior to hard-binding)

Appendix G. Participant information and informed consent form

The Effect of Rumination on Concreteness of Moment-By-Moment Awareness

Participant Information

This study aims to investigate the effect of a particular type of repetitive thinking, called rumination, on the way in which people perceive the world around them. Your participation in this investigation is completely voluntary and as such, you are free to withdraw from the study at any time without giving any reason.

You will first be asked to complete three questionnaires. Next, you will be asked to complete a task involving the description of two pictures and what you are aware of. You will then be asked to either focus on a series of sentences or do nothing for five minutes. It is possible that those focusing on the sentences may find the process mildly upsetting. However, this procedure has been used in many previous studies, which have found no lasting effect on mood. Finally, you will be asked to describe a further two pictures and what you are aware of once again. The whole procedure will require approximately half an hour of your time.

Your individual responses to questions asked during this investigation will be completely anonymous. All raw data collected will be stored securely within the Hertford Building at the University of Hull for five years, at which time it shall be destroyed. If you have any questions about the information above or about the study in general please feel free to ask.

Informed Consent

Please initial each of the following statements in the boxes provided

1. I confirm that I have read and understand the participant information above. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw from the investigation at any time without giving any reason. ☐

3. I agree to take part in the above study. ☐

Name of participant: Date:

Signature of participant:

Name of person taking consent: Date:

Signature of person taking consent:

Appendix H. Demographic questionnaire

Demographic Questionnaire

Please provide your age and gender below.

Age:

Gender:

Appendix I. Beck Depression Inventory II (copyrighted material – removed prior to hard-binding)

Appendix J. Ruminative Responses Scale

Ruminative Responses Scale (RRS)

People think and do many different things when they feel low. Please read the following 22 statements and circle whether you never, sometimes, often or always think or do each one when you feel sad, down or depressed. Please indicate what you generally do, not what you think you should do.

1. Think about how alone you feel.

Never Sometimes Often Always

2. Think “I won’t be able to do my job if I don’t snap out of this.”

Never Sometimes Often Always

3. Think about your feelings of fatigue and achiness.

Never Sometimes Often Always

4. Think about how hard it is to concentrate.

Never Sometimes Often Always

5. Think “What am I doing to deserve this?”

Never Sometimes Often Always

6. Think about how passive and unmotivated you feel.

Never Sometimes Often Always

7. Analyze recent events to try to understand why you are depressed.

Never Sometimes Often Always

8. Think about how you don't seem to feel anything anymore.

Never Sometimes Often Always

9. Think "Why can't I get going?"

Never Sometimes Often Always

10. Think "Why do I always react this way?"

Never Sometimes Often Always

11. Go away by yourself and think about why you feel this way.

Never Sometimes Often Always

12. Write down what you are thinking and analyze it.

Never Sometimes Often Always

13. Think about a recent situation, wishing it had gone better.

Never Sometimes Often Always

14. Think "I won't be able to concentrate if I keep feeling this way."

Never Sometimes Often Always

15. Think "Why do I have problems other people don't have?"

Never Sometimes Often Always

16. Think "Why can't I handle things better?"

Never Sometimes Often Always

17. Think about how sad you feel.

Never Sometimes Often Always

18. Think about all your shortcomings, failings, faults, mistakes.

Never Sometimes Often Always

19. Think about how you don’t feel up to doing anything.

Never Sometimes Often Always

20. Analyze your personality to try to understand why you are depressed.

Never Sometimes Often Always

21. Go someplace alone to think about your feelings.

Never Sometimes Often Always

22. Think about how angry you are with yourself.

Never Sometimes Often Always

Appendix K. Concreteness of thinking assessment: Visual scenes

(copyrighted material – removed prior to hard-binding)

Appendix L. Concreteness of thinking assessment: Subjective awareness

Describe in detail whatever you are aware of at this very moment.

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Appendix M. Written instructions for reflection condition

Spend the next five minutes following the instructions below. You will not be asked to disclose your thoughts during this time to the experimenter.

Think about a recent event in which you felt low in mood.

Think about how you felt at the time.

Analyse why you felt that way.

Analyse what you were thinking at the time.

Analyse aspects of your personality that may have contributed to how you felt.

Appendix N. Written instructions for brooding condition

Spend the next five minutes following the instructions below. You will not be asked to disclose your thoughts during this time to the experimenter.

Think about a recent situation that you wish had gone better and that left you feeling low in mood.

Think about what you may have done to deserve what happened.

Think about why the situation may have gone differently for other people.

Think about why you reacted in the way that you did.

Think about why you didn’t handle the situation better.

Appendix O. Written instructions for control condition

Spend the next five minutes doing nothing. You will not be asked to disclose your thoughts during this time to the experimenter.

Appendix P. Information on how to access additional support

Information on How to Access Additional Support

Student Counselling Service

We are here to help students at the university to cope and come to terms with any issues or difficulties they face during their time as a student.

Drop in: On the Hull Campus we operate a "Drop-In" every weekday during semesters between 12 noon and 1pm when you can see a counsellor for a brief consultation without making an appointment (just turn up). Drop-In does not operate during the vacations.

Find us: 138 Cottingham Road
Tel: 01482 465166 (with answer phone)
Email: studentcounselling@hull.ac.uk
Or call in to make an appointment.

Opening Times: Student counselling is open on Mondays, Tuesdays, Wednesdays and Thursdays 9am - 5pm (closed between 1-1.45 for lunch) and on Fridays 9am - 4pm (closed between 1-1.45 for lunch).

During Vacation: Counselling is available on the Hull campus at a reduced level of service during vacations, by appointment only. There are some days in each vacation when the service will not be available due to staff holidays. Appointments can be arranged by calling:

Student Support Services Office: (3rd floor of Students' Union building)
Tel: 01482 465297
Email: studenthelp@hull.ac.uk
Web: http://student.hull.ac.uk/support

Disability Services: (3rd floor of Students' Union building)
Tel: 01482 466833
Email: disability-services@hull.ac.uk
Web: www.hull.ac.uk/disability

Other support (during times Student Counselling is closed)

Samaritans
Tel: 01482 343456 (Local) or 08457 909090 (National)
Email: Jo@samaritans.org

HOPELineUK
Tel: 0870 170 4000

If you do have any particular worries or concerns, then you can always make an appointment to see your GP.

Appendix Q. SPSS output tables for analyses

Analyses of variance in characteristics of participants between conditions

Tests of Between-Subjects Effects

Dependent Variable: Age

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	106.300[a]	2	53.150	.715	.494
Intercept	39475.350	1	39475.350	531.015	.000
Condition	106.300	2	53.150	.715	.494
Error	4237.350	57	74.339		
Total	43819.000	60			
Corrected Total	4343.650	59			

Tests of Between-Subjects Effects

Dependent Variable: Gender

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.533[a]	2	.267	1.114	.335
Intercept	156.817	1	156.817	654.839	.000
Condition	.533	2	.267	1.114	.335
Error	13.650	57	.239		
Total	171.000	60			
Corrected Total	14.183	59			

Tests of Between-Subjects Effects

Dependent Variable: BDI-II Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	36.300[a]	2	18.150	.255	.776
Intercept	9077.400	1	9077.400	127.432	.000
Condition	36.300	2	18.150	.255	.776
Error	4060.300	57	71.233		
Total	13174.000	60			
Corrected Total	4096.600	59			

Tests of Between-Subjects Effects

Dependent Variable: RRS Reflection Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	14.433[a]	2	7.217	.630	.536
Intercept	6826.667	1	6826.667	595.987	.000
Condition	14.433	2	7.217	.630	.536
Error	652.900	57	11.454		
Total	7494.000	60			
Corrected Total	667.333	59			

Tests of Between-Subjects Effects

Dependent Variable: RRS Brooding Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.300[a]	2	2.150	.255	.776
Intercept	6552.150	1	6552.150	777.177	.000
Condition	4.300	2	2.150	.255	.776
Error	480.550	57	8.431		
Total	7037.000	60			
Corrected Total	484.850	59			

Tests of Between-Subjects Effects

Dependent Variable: RRS Total Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	75.600[a]	2	37.800	.329	.721
Intercept	137664.600	1	137664.600	1199.132	.000
Condition	75.600	2	37.800	.329	.721
Error	6543.800	57	114.804		
Total	144284.000	60			
Corrected Total	6619.400	59			

T-tests comparing quantity of data yielded by written and verbal means during pilot study

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pre-IV visual scenes phrases	Equal variances assumed	20.783	.020	-.425	3	.699	-9.667	22.722	-81.979	62.645
	Equal variances not assumed			-.343	1.187	.783	-9.667	28.210	-258.865	239.531
Pre-IV subjective awareness phrases	Equal variances assumed	.919	.408	.255	3	.815	1.333	5.235	-15.327	17.994
	Equal variances not assumed			.232	1.666	.842	1.333	5.754	-28.837	31.503
Post-IV visual scenes phrases	Equal variances assumed	.001	.980	-.164	3	.880	-3.500	21.373	-71.518	64.518
	Equal variances not assumed			-.160	2.106	.887	-3.500	21.869	-93.180	86.180
Post-IV subjective awareness phrases	Equal variances assumed	.221	.670	.828	3	.469	3.667	4.431	-10.433	17.767
	Equal variances not assumed			.870	2.644	.456	3.667	4.216	-10.833	18.167

T-tests comparing pre and post-IV CQs for visual scenes and subjective awareness in the reflection condition

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Post-IV CQ for visual scenes - Pre-IV CQ for visual scenes	-.14841	.20276	.04534	-.24331	-.05352	-3.273	19	.004
Pair 2	Post-IV CQ for subjective awareness - Pre-IV CQ for subjective awareness	-.15131	.80010	.17891	-.52577	.22315	-.846	19	.408

T-tests comparing pre and post-IV CQs for visual scenes and subjective awareness in the brooding condition

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Post-IV CQ for visual scenes - Pre-IV CQ for visual scenes	-.05404	.18463	.04129	-.14046	.03237	-1.309	19	.206
Pair 2	Post-IV CQ for subjective awareness - Pre-IV CQ for subjective awareness	.09650	.52521	.11744	-.14930	.34231	.822	19	.421

T-tests comparing pre and post-IV CQs for visual scenes and subjective awareness in the control condition

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Post-IV CQ for visual scenes - Pre-IV CQ for visual scenes	-.11664	.21110	.04720	-.21544	-.01784	-2.471	19	.023
Pair 2	Post-IV CQ for subjective awareness - Pre-IV CQ for subjective awareness	-.13283	.48361	.10814	-.35917	.09350	-1.228	19	.234

T-tests comparing pre and post-IV CQs for visual scenes and subjective awareness across the whole sample

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Post-IV CQ for visual scenes - Pre-IV CQ for visual scenes	-.10637	.20033	.02586	-.15811	-.05462	-4.113	59	.000
Pair 2	Post-IV CQ for subjective awareness - Pre-IV CQ for subjective awareness	-.06255	.61905	.07992	-.22246	.09737	-.783	59	.437

Analysis of covariance in pre to post-IV differences in CQs for visual scenes

Tests of Between-Subjects Effects

Dependent Variable: Pre to post-IV difference in CQ for visual scenes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.343[a]	7	.049	1.258	.289	.145
Intercept	.122	1	.122	3.140	.082	.057
Age	.008	1	.008	.196	.660	.004
Gender	.070	1	.070	1.807	.185	.034
BDI-II Score	.040	1	.040	1.019	.317	.019
RRS Total Score	.109	1	.109	2.804	.100	.051
Verbosity	.091	1	.091	2.326	.133	.043
Condition	.087	2	.044	1.119	.334	.041
Error	2.025	52	.039			
Total	3.047	60				
Corrected Total	2.368	59				

Analysis of covariance in pre to post-IV differences in CQs for subjective awareness

Tests of Between-Subjects Effects

Dependent Variable: Pre to post-IV difference in CQ for subjective awareness

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.159[a]	7	.308	.784	.604	.095
Intercept	.014	1	.014	.036	.851	.001
Age	.124	1	.124	.314	.577	.006
Gender	.615	1	.615	1.564	.217	.029
BDI-II Score	.024	1	.024	.061	.807	.001
RRS Total Score	.003	1	.003	.008	.927	.000
Verbosity	.313	1	.313	.796	.376	.015
Condition	.435	2	.218	.553	.579	.021
Error	20.451	52	.393			
Total	22.845	60				
Corrected Total	22.610	59				

Analysis of covariance in pre to post-IV differences in CQs for visual scenes when comparing reflection and brooding conditions

Tests of Between-Subjects Effects

Dependent Variable: Pre to post-IV difference in CQ for visual scenes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.341[a]	6	.057	1.595	.180	.225
Intercept	.085	1	.085	2.392	.131	.068
Age	.017	1	.017	.486	.491	.015
Gender	.046	1	.046	1.296	.263	.038
BDI-II Score	.019	1	.019	.544	.466	.016
RRS Total Score	.177	1	.177	4.978	.033	.131
Verbosity	.000	1	.000	.005	.945	.000
Condition	.102	1	.102	2.854	.101	.080
Error	1.177	33	.036			
Total	1.928	40				
Corrected Total	1.518	39				

Analysis of covariance in pre to post-IV differences in CQs for subjective awareness when comparing reflection and brooding conditions

Tests of Between-Subjects Effects

Dependent Variable: Pre to post-IV difference in CQ for subjective awareness

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.151[a]	6	.358	.745	.617	.119
Intercept	.070	1	.070	.146	.705	.004
Age	.434	1	.434	.903	.349	.027
Gender	1.178	1	1.178	2.450	.127	.069
BDI-II Score	.228	1	.228	.475	.496	.014
RRS Total Score	.032	1	.032	.066	.799	.002
Verbosity	.003	1	.003	.006	.939	.000
Condition	.448	1	.448	.932	.341	.027
Error	15.868	33	.481			
Total	18.048	40				
Corrected Total	18.018	39				

Analysis of covariance in pre to post-IV differences in CQs for visual scenes when comparing reflection and control conditions

Tests of Between-Subjects Effects

Dependent Variable: Pre to post-IV difference in CQ for visual scenes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.336[a]	6	.056	1.419	.237	.205
Intercept	.062	1	.062	1.580	.218	.046
Age	.010	1	.010	.253	.618	.008
Gender	.099	1	.099	2.499	.123	.070
BDI-II Score	.090	1	.090	2.277	.141	.065
RRS Total Score	.097	1	.097	2.447	.127	.069
Verbosity	.170	1	.170	4.301	.046	.115
Condition	.042	1	.042	1.054	.312	.031
Error	1.302	33	.039			
Total	2.340	40				
Corrected Total	1.638	39				

Analysis of covariance in pre to post-IV differences in CQs for subjective awareness when comparing reflection and control conditions

Tests of Between-Subjects Effects

Dependent Variable: Pre to post-IV difference in CQ for subjective awareness

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.877[a]	6	.479	1.152	.355	.173
Intercept	.687	1	.687	1.651	.208	.048
Age	.355	1	.355	.853	.363	.025
Gender	.073	1	.073	.175	.678	.005
BDI-II Score	.751	1	.751	1.804	.188	.052
RRS Total Score	.028	1	.028	.067	.797	.002
Verbosity	1.105	1	1.105	2.656	.113	.074
Condition	.167	1	.167	.402	.531	.012
Error	13.734	33	.416			
Total	17.418	40				
Corrected Total	16.610	39				

Analysis of covariance in pre to post-IV differences in CQs for visual scenes when comparing brooding and control conditions

Tests of Between-Subjects Effects

Dependent Variable: Pre to post-IV difference in CQ for visual scenes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.196[a]	6	.033	.807	.572	.128
Intercept	.062	1	.062	1.522	.226	.044
Age	.022	1	.022	.534	.470	.016
Gender	.027	1	.027	.658	.423	.020
BDI-II Score	.005	1	.005	.119	.732	.004
RRS Total Score	.016	1	.016	.383	.540	.011
Verbosity	.100	1	.100	2.463	.126	.069
Condition	.005	1	.005	.128	.722	.004
Error	1.337	33	.041			
Total	1.825	40				
Corrected Total	1.534	39				

Analysis of covariance in pre to post-IV differences in CQs for subjective awareness when comparing brooding and control conditions

Tests of Between-Subjects Effects

Dependent Variable: Pre to post-IV difference in CQ for subjective awareness

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1.444[a]	6	.241	.906	.503	.141
Intercept	.006	1	.006	.022	.883	.001
Age	.013	1	.013	.048	.828	.001
Gender	.236	1	.236	.890	.352	.026
BDI-II Score	.322	1	.322	1.213	.279	.035
RRS Total Score	.041	1	.041	.154	.697	.005
Verbosity	.225	1	.225	.845	.365	.025
Condition	.227	1	.227	.856	.362	.025
Error	8.767	33	.266			
Total	10.224	40				
Corrected Total	10.211	39				

Pearson's product moment correlation coefficients between variables

Correlations

		Condition	Age	Gender	BDI-II Score	RRS Reflection Score	RRS Brooding Score	RRS Total Score	Visual Scenes Verbosity	Subjective Awareness Verbosity	Pre-IV CQ for visual scenes	Post-IV CQ for visual scenes	Pre-IV CQ for subjective awareness	Post-IV CQ for subjective awareness
Condition	Pearson Correlation	1	-.089	.168	.000	-.080	-.093	-.105	-.024	-.151	-.090	-.051	.023	.031
	Sig. (2-tailed)		.500	.200	1.000	.546	.478	.425	.854	.251	.493	.701	.860	.817
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
Age	Pearson Correlation	-.089	1	.092	.042	.192	-.066	.015	-.084	.083	-.254	-.230	.019	.073
	Sig. (2-tailed)	.500		.482	.753	.142	.617	.911	.526	.526	.050	.077	.886	.580
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
Gender	Pearson Correlation	.168	.092	1	.004	-.038	-.128	-.092	.106	-.265*	.095	-.002	.232	.085
	Sig. (2-tailed)	.200	.482		.977	.775	.328	.483	.420	.041	.469	.986	.074	.517
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
BDI-II Score	Pearson Correlation	.000	.042	.004	1	.301*	.502**	.487**	.025	.166	-.170	-.169	-.140	-.081
	Sig. (2-tailed)	1.000	.753	.977		.019	.000	.000	.848	.205	.194	.196	.284	.539
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
RRS Reflection Score	Pearson Correlation	-.080	.192	-.038	.301*	1	.513**	.821**	.065	.255*	-.275*	-.222	-.122	-.030
	Sig. (2-tailed)	.546	.142	.775	.019		.000	.000	.619	.049	.034	.089	.353	.822
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
RRS Brooding Score	Pearson Correlation	-.093	-.066	-.128	.502**	.513**	1	.805**	-.124	.040	-.302*	-.156	-.090	-.079
	Sig. (2-tailed)	.478	.617	.328	.000	.000		.000	.347	.760	.019	.234	.496	.549
	N	60	60	60	60	60	60	60	60	60	60	60	60	60

RRS Total Score	Pearson Correlation	-.105	.015	-.092	.487**	.821**	.805**	1	-.075	.084	-.346**	-.241	-.209	-.163
	Sig. (2-tailed)	.425	.911	.483	.000	.000	.000		.570	.521	.007	.064	.109	.213
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
Visual Scenes Verbosity	Pearson Correlation	-.024	-.084	.106	.025	.065	-.124	-.075	1	.354**	.542**	.622**	.139	.127
	Sig. (2-tailed)	.854	.526	.420	.848	.619	.347	.570		.005	.000	.000	.289	.334
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
Subjective Awareness Verbosity	Pearson Correlation	-.151	.083	-.265*	.166	.255*	.040	.084	.354**	1	.137	.079	.019	.157
	Sig. (2-tailed)	.251	.526	.041	.205	.049	.760	.521	.005		.296	.547	.886	.231
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
Pre-IV CQ for visual scenes	Pearson Correlation	-.090	-.254	.095	-.170	-.275*	-.302*	-.346**	.542**	.137	1	.837**	.307*	.161
	Sig. (2-tailed)	.493	.050	.469	.194	.034	.019	.007	.000	.296		.000	.017	.219
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
Post-IV CQ for visual scenes	Pearson Correlation	-.051	-.230	-.002	-.169	-.222	-.156	-.241	.622**	.079	.837**	1	.311*	.204
	Sig. (2-tailed)	.701	.077	.986	.196	.089	.234	.064	.000	.547	.000		.016	.118
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
Pre-IV CQ for subjective awareness	Pearson Correlation	.023	.019	.232	-.140	-.122	-.090	-.209	.139	.019	.307*	.311*	1	.765**
	Sig. (2-tailed)	.860	.886	.074	.284	.353	.496	.109	.289	.886	.017	.016		.000
	N	60	60	60	60	60	60	60	60	60	60	60	60	60
Post-IV CQ for subjective awareness	Pearson Correlation	.031	.073	.085	-.081	-.030	-.079	-.163	.127	.157	.161	.204	.765**	1
	Sig. (2-tailed)	.817	.580	.517	.539	.822	.549	.213	.334	.231	.219	.118	.000	
	N	60	60	60	60	60	60	60	60	60	60	60	60	60